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A HISTORY  
OF  
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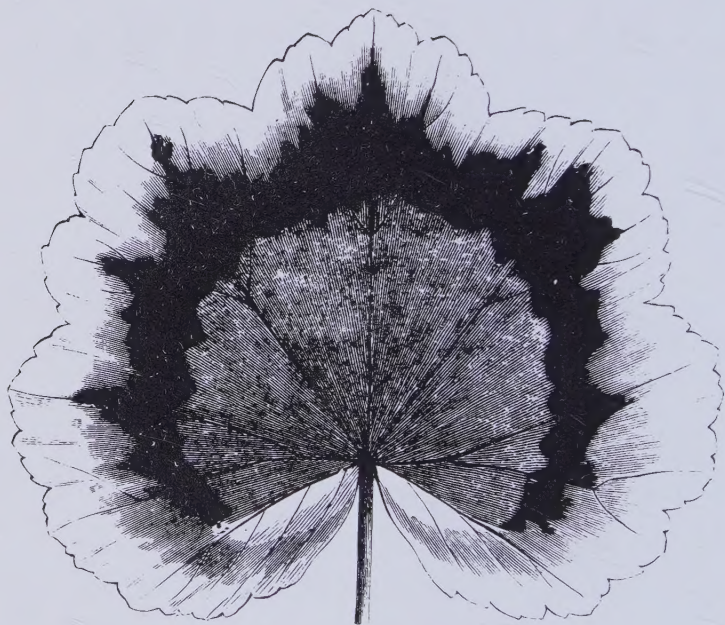
BY PETER GRIEVE

SECOND EDITION, ENLARGED

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MISS MARY CAMPBELL (1907-1977)  
herself a distinguished hybridist of Pelargoniums and  
a dedicated enthusiast for the Fancy-leaved varieties.

THE BRITISH PELARGONIUM & GERANIUM SOCIETY

1977



PELARGONIUM "SOPHIA CUSACK."

A HISTORY  
OF  
ORNAMENTAL-FOLIAGED  
P E L A R G O N I U M S

WITH PRACTICAL HINTS FOR THEIR  
PRODUCTION, PROPAGATION, AND CULTIVATION

BY  
PETER GRIEVE

CULFORD, BURY ST EDMUNDS

SECOND EDITION, ENLARGED

WILLIAM BLACKWOOD AND SONS  
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"THE TINTS OF THE EARTH, AND THE HUES OF THE SKY,  
IN COLOUR THOUGH VARIED, IN BEAUTY MAY VIE."

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# INTRODUCTION

## TO SECOND EDITION.

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IN issuing the Second Edition of this little work, the Author would most respectfully beg to record his grateful acknowledgments to the Horticultural Press for the very favourable reception universally accorded to the First Edition; and also to that portion of the general Public interested in Floricultural pursuits, for its kind appreciation of the same.

It is earnestly hoped that the Second Edition, from its additional matter, and descriptive list of varieties, may prove of increased interest, and be found useful in assisting to form, or to add to, collections of these plants.

## INTRODUCTION

TO FIRST EDITION.

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THE class of Ornamental Plants known as Variegated Zonal Pelargoniums,—or sometimes, but with less truth, or precision of definition, as Tricolor Pelargoniums—the Tricolor Pelargonium being a very different plant,—having deservedly become public favourites, and my humble efforts having been in some degree instrumental in their production, it has come to pass that my name has to a certain extent become identified with them. This fact has brought upon me a considerable amount of interrogatory correspondence respecting them, emanating from various parts of the country; and I have, in consequence thereof, been induced to offer to the



public, in the following pages, my experience upon the subject. In doing this, however, I have not presumed to suppose that my remarks will be of any value to the scientific hybridizer, or the already successful cross-breeder, though it is hoped they may be found useful as affording guidance, or at least proving suggestive, to the uninitiated amateurs who may intend to become experimentalists in this extensive field of inquiry.

The flowers of the earth have, somewhat poetically perhaps, although not unaptly, been compared to the stars of the firmament; and as the reflected light from some of the latest created or most remote of these orbs is supposed to have not yet reached our world, so, with regard to the flowers of the earth, it may also be supposed that it is reserved for distant ages, aided by human intelligence, to fully develop and realize their ever-increasing but inherent splendours. A celebrated astronomer has said that an undevout astronomer must be mad; and a more recent writer has compared the Floriculturist to an

astronomer with Newton's telescope reversed ; and he adds, that if its revelations do not stir up holy thoughts in his soul, he must be blind as well as mad.

It has sometimes been considered as presumptuous to attempt to guide the hand of Nature in certain of her most delicate and mysterious operations. Still, Nature does not appear in any way inclined to resent such interference ; and consequently, the assisting her, as it were, in the production of new and varied forms and combinations of beauty, must surely be considered as a rational and an interesting pursuit. It is one, moreover, in which amateurs of all grades may successfully participate, from the humble owner of a window-sill to the wealthy proprietor of the most extensive horticultural establishment.

Should the perusal of the following pages tend in any degree to foster or to encourage a taste for this pursuit, the Author may then, perhaps, be justified in supposing that he has not written them altogether in vain.

# CONTENTS.

---

	PAGE
INTRODUCTION, . . . . .	v

## CHAPTER I.

ON VARIEGATION; ITS SPONTANEOUS DEVELOPMENT, AND THE VARIOUS FORMS WHICH IT ASSUMES IN THE DIF- FERENT FAMILIES OR TRIBES OF PLANTS, . . . .	9
--	---

## CHAPTER II.

VARIEGATION AND COLORATION CONSIDERED AS DISTINCT FROM EACH OTHER, . . . . .	13
---	----

## CHAPTER III.

INQUIRY INTO THE HISTORY OR ORIGIN OF THE VARIE- GATED ZONAL PELARGONIUM, . . . . .	17
--	----

## CHAPTER IV.

REMARKS ON SPORTS AND SEEDLINGS, . . . . .	29
--	----

## CHAPTER V.

ON THE PRODUCTION OF VARIEGATED ZONAL PELARGO- NIUMS, . . . . .	33
--	----

## CHAPTER VI.

ON THE QUALITIES AND PROPERTIES WHICH SHOULD BE FOUND IN VARIETIES POSSESSING A HIGH DEGREE OF MERIT, . . . . .	56
---	----

## CHAPTER VII.

ON THE PROPAGATION AND CULTIVATION OF THE VARIE- GATED ZONAL PELARGONIUM, . . . . .	60
--	----

## CHAPTER VIII.

VARIEGATED AND BRONZE ZONAL PELARGONIUMS FOR THE PURPOSE OF WINTER DECORATION, . . . . .	70
---	----

## CHAPTER IX.

DESCRIPTIVE OF THE BEST VARIETIES OF VARIEGATED AND BRONZE PELARGONIUMS, . . . . .	85
---	----

## APPENDIX.

LETTERS RELATING TO VARIEGATED ZONAL PELARGONIUMS, BY VARIOUS WRITERS, . . . . .	107
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# A HISTORY OF VARIEGATED ZONAL PELARGONIUMS.

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## CHAPTER I.

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### ON VARIEGATION AND ITS VARIOUS FORMS.

VARIEGATION in the foliage of plants may be justly considered as a very interesting phenomenon, although our present knowledge of the subject furnishes us with no information whatever as to its cause or causes. Hence we are unacquainted with any certain means of producing it.

It has been considered by some intelligent persons as analogous to disease, and it is quite certain that its presence is generally, if not always, accompanied by a considerable amount of debility, or, at least, by a diminution of constitutional vigour, which, in some degree, furnishes argument in support of this view of its nature. It would appear that there are very few, if any, orders or families in the Vegetable Kingdom in which it does not occasionally appear, from the



oaks, the elms, &c., of our woods and forests, to the chickweed which infests our gardens and cultivated grounds.

Scientific men do not appear as yet to have given this subject a very great amount of attention, and it would, of course, be like presumption on my part to attempt to offer anything like an elucidation of a matter so mysterious and important. I may, however, be allowed to say that the subject appears to me to offer a very wide and interesting field for scientific inquiry and research.

It would appear that Dr. Morren, on examining microscopically the white portions of the variegated leaves of the *Euonymus japonicus*, the *Syringa*, and other variegated plants, found uniformly that they had cells filled with air or gas in immediate contact with the chlorophyll, or colouring substance; but the parts of the leaves which were green had no such cells filled with gas, in contact with the chlorophyll. This would seem to indicate that the chlorophyll is neutralized, or rendered colourless, by the immediate contact or presence of these air cells. Be this as it may, it must be remembered that the leaves of plants are the natural appendages of the branches, and are, in fact, an extension or continuation of the rind of the stem and the branches; and the thin transparent skin with which the leaf is covered is also an extension of the epidermis, or outer skin, of the plant. Now, when we take into consideration the importance of the offices which the leaves are called upon to exercise, being nothing less than the functions of

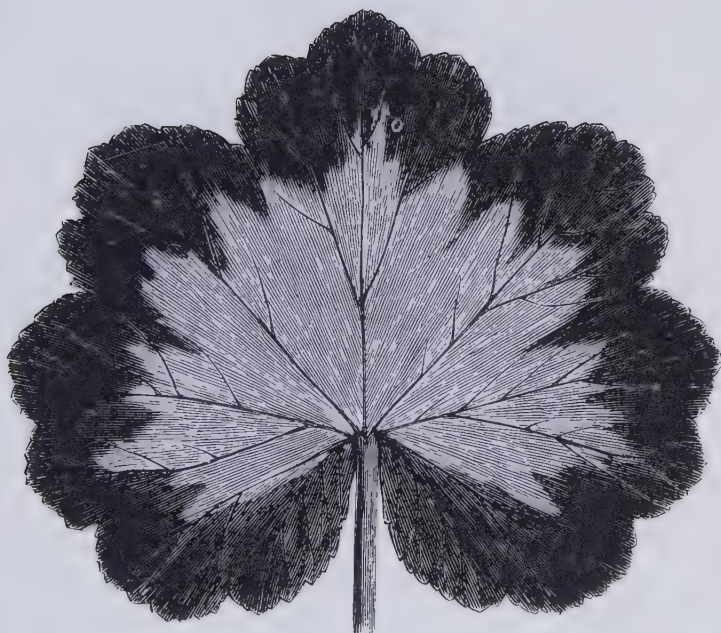
digestion, respiration, and perspiration, it must be perfectly obvious that any cause which in any way affects the foliage must have a corresponding immediate or ultimate effect upon the health of the plant. This circumstance will sufficiently account for the diminution of vigour usually accompanying variegated foliage.

Variegation appears to show itself in a variety of forms, in different orders or tribes of the Vegetable Kingdom. Thus, in the case of the *Aucuba japonica*, we find the entire surface of the leaf spotted or blotched, while in the *Lonicera aureo-reticulata*, or Japanese Honeysuckle, the surface of the leaves is beautifully reticulated. Some of the *Vincas* and other plants are also variegated in this reticulated manner, while in the *Farfugium grande*, &c., the surface of the leaves is irregularly spotted with yellow.

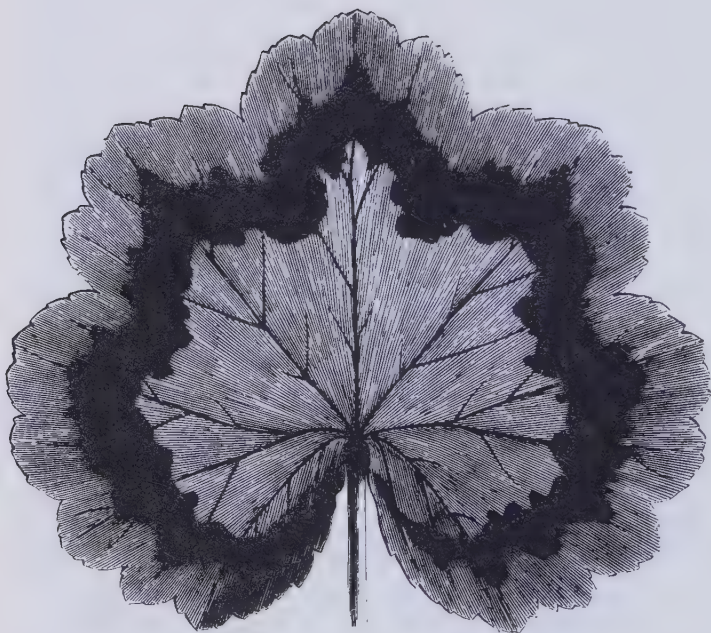
Generally speaking, however, variegation may be said to be marginal in its development; and with regard to the tribe of plants of which it is my intention to treat, namely, the *Pelargoniums*, it may, I think, be said to be almost invariably so in the fully developed condition; for although it is by no means uncommon for seedling plants in their early stages to produce numerous leaves the surfaces of which are irregularly splashed or blotched with white or yellow, still they ultimately resolve themselves into some regular or symmetrical form of marginal variegation, or otherwise recover, as it were, from their variegated tendencies altogether, and become entirely green.

Something, however, like an inclination to altogether reverse this marginal form of variegation has on several occasions shown itself amongst seedling Pelargoniums, since the foliage, in the cases now alluded to, presents a centre or disc, which is to some extent wanting in its supply of chlorophyll, or green colouring matter, while the margins are of the darkest possible shade of green. This apparent predisposition on the part of some seedlings has, as may be supposed, raised the hopes of many enthusiastic experimentalists, so that every expedient is being resorted to in order to take advantage of this tendency; and should these endeavours be crowned with success, they may possibly lead to the development of forms and combinations of ornamental foliage which at present are scarcely contemplated.

Double flowers and variegated foliage have by some learned men been held to be incompatible with each other in the same individual: the one, it is said, being indicative of strength, and the other of weakness. But this opinion is not supported by facts, as the variegated form of the *Kerria japonica*, the variety of *Chrysanthemum* called "Sensation," and various other examples sufficiently prove. Moreover, I think it quite possible that in the genus *Pelargonium* itself, we may ere long have variegated varieties, producing double flowers.



PELARGONIUM "CRIMSON NOSEGAY."



PELARGONIUM "PRINCESS OF WALES"  
(A BRONZE ZONAL).



## CHAPTER II.



### ON VARIEGATION AS DISTINCT FROM COLORATION.

UPON this subject there may exist diversity of opinion. Some persons have contended that as green is the normal colour of vegetation, any deviation from that colour must necessarily be considered as variegation ; and others, again, have held that, as in its grammatical interpretation the word “variegation” means diversity of colours, any leaf having two or more shades of colour upon its surface must consequently be variegated.

It must, of course, be conceded that green is the ordinary normal colour of vegetation ; but it must also be borne in mind that there are many deviations from the green condition, which can hardly be considered as variegation, more particularly as regards tropical vegetation. Surely such plants as many of the *Dracænas*, or even the *Amaranthus*, the Beets, and the dark-coloured Kales, or even red Cabbages of our gardens, with many more that might be cited, can hardly be considered as variegated plants, though presenting striking deviations from the normal green

of vegetation in general. The term "coloured," or "colored," is certainly more applicable to them, and also to the ornamental-leaved Begonias, Marantas, Caladiums, &c.

In this opinion I think that I am supported by the learned editors of the *Gardeners' Chronicle*, who in writing upon this subject in the volume of that journal for 1867, p. 737, say:—"Regarding a green leaf as being in the normal condition, and taking this as a starting-point, Variegation may be called a deficiency, something wanting or imperfectly formed; whilst Coloration may be called a redundancy, something added to the green. We find no difficulty in compassing and distinguishing these two ideas. Coloration is not a new word of ours; it has, like variegation, been applied to the condition indicated above by vegetable physiologists." "Let us add," they further say, "for the sake of distinctness, that we do not regard the Pelargonium 'Mrs. Pollock' as a variegated plant on account of its zone, but because of its green disc and yellow margin."

If this view of the matter be correct, as I think it must be admitted to be, it follows that the Variegated Zonal or Tricolor Pelargoniums may be considered as displaying a combination or union of coloration with variegation,—the dark zone entitling it to be considered as a colored plant; while the green disc, with yellow or white margins, constitutes its variegation. The zone does not appear to undergo any change when the leaf becomes variegated; but as being not irrelevant to this subject, I will here quote

from a letter of mine, which appeared in the *Journal of Horticulture* (vol. xii., p. 275) :—

“If any one will take the trouble to carefully examine a leaf of a heavily zoned Pelargonium, he will find that the change which takes place when that leaf is induced to become variegated, is not quite so wonderful as it may at first sight appear to be. The upper surface of the leaf shows, we will suppose, a well defined zone, or horse-shoe, but the under side shows no indication of a zone whatever, and if a leaf be cut into two pieces, the assistance of a magnifying glass will show that the brown colouring matter which constitutes the zone does not extend to the entire thickness of the leaf, but appears somewhat in the form of a coat of dark brown paint, resting upon the green tissue of the leaf, and kept, as it were, in its place by the translucent epidermis which covers the upper surface.

“Now, when a variety of Pelargonium to which the dark zone is natural, can be induced to become variegated or yellow (or white) margined, the natural position or locality of the zone is over the very part where the undulating or irregular junction of the yellow (or white) margin with the green disc or centre of the leaf takes place; consequently, whatever portion of the yellow (or white) margin happens to lie under the brown zone will, as seen through the transparent epidermis of the upper surface of the leaf, appear quite red—the production, it may be, of the brown and yellow colouring matter; while that portion of the zone which may rest upon the green part

of the leaf retains its normal or brown colour to a certain extent, influenced, however, by a certain amount of blending, possibly resulting from the contact of the different colouring matters contained in the leaf, and giving to the entire zone, as seen through the transparent epidermis, that rich bronzy shade of colour which in many of the best varieties is so deservedly admired."

To admit that every plant whose leaves exhibit two shades of colour upon their surface must, therefore, be considered as variegated, would necessarily include as variegated plants nearly all of that large and beautiful class of plants known by the somewhat indefinite term of "Foliage Plants," or "Fine Foliage Plants," which term, however, is sufficiently well understood to signify plants whose foliage is considered as more ornamental or more worthy of attention than their flowers; and although this group or class will necessarily include variegated plants, still it will not follow that all the so-called "Foliaged Plants" are to be considered as variegated.

### CHAPTER III.

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#### HISTORY OF THE VARIEGATED ZONAL PELARGONIUM.

THE Pelargonium belongs to the natural order Geraniaceæ, a group of plants embracing also the Geranium, the Erodium, and some two or three other genera. The Geraniums and the Erodiums are chiefly natives of the Northern, while the Pelargoniums are nearly all indigenous to the Southern hemisphere. According to the Linnæan system of classification, the Pelargonium falls under Class 16, Order 4, viz., "Monadelphia Heptandria," while the Geranium is placed in Class 16, Order 6, viz., "Monadelphia Decandria." The English name of the Geranium, it may be as well to observe, is Crane's Bill, while that of the Pelargonium is Stork's Bill.

The species of Pelargonium are nearly all natives of the Cape of Good Hope. *Pelargonium zonale*, the Horse-shoe or Zonate Stork's Bill, appears to have been introduced into this country about the year 1710, and *Pelargonium inquinans*, the Staining or Scarlet Stork's Bill, about 1714. It is from the modern Zonal Pelargonium, which no doubt has resulted from the blending of these two species, that



the Variegated Zonal or Tricolor-leaved Pelargoniums have descended.

In Miller's "Gardeners' Dictionary" mention is made of a variety of *Pelargonium zonale* with fine variegated leaves, and in Loudon's "Hortus Britannicus" it is, doubtless, the same variety which is recorded under the name of "marginatum," or white-margined, but the date of its introduction is not given in either of these books. It is probable that this was the first variegated sport or variety observed in the genus, and the same as the "Striped-leaved Geranium," mentioned in the following passage, by Sir Thomas More, Bart., in his "Flower Garden Displayed" (second edition, 1734), wherein the Scarlet Geranium is represented in the bouquet copper-plate engravings for both the months of June and December. After stating that he brought it first from Holland, the author adds that "it is a greenhouse plant, and makes a shrub of about two feet high. It has its name from the colour of its flowers, which are in beautiful bunches, and of as bright a scarlet as seen in any flower. The time for taking them into the garden or open air, is about the middle of May, when the weather is settled, and plants raised from cuttings in any of the summer months may be potted by September, and set in a greenhouse about the end of that month." Of the Striped-leaved Geranium the author states, "The leaves of this plant are edged with cream colour, and it makes one of the most beautiful shrubs among the greenhouse plants. This I first brought into England from the Paris gardens,

and as it grows very freely by cuttings planted in May or any of the summer months, it has now grown very plenty in the curious gardens. The flowers appear at almost every season of the year, of a peach-blossom colour; and it must be treated in every respect like what is called the Scarlet Geranium."

This may not improbably be the variety afterwards known as Miller's Variegated, which appears to have been grown as a rather rare greenhouse plant in this country for many years. A more recent variegated-leaved variety is that which has been named Lee's Variegated, and it is from this latter that Mr. Kinghorn succeeded in 1848 in raising the well known variety called "Flower of the Day." Soon after the introduction of this very useful bedding variety, namely, in 1850, the same raiser succeeded in originating what may be considered as the first Silver Tricolor-leaved Pelargonium—a variety which was named "Attraction," and which was much and deservedly admired, though it was, however, closely followed by the "Countess of Warwick," another of Mr. Kinghorn's varieties. About this time several other cross-breeders would appear to have entered the field, and their united efforts resulted in the introduction of numerous beautiful varieties, conspicuous amongst which was that called the "Queen's Favourite," raised by Mr. Elphinstone, and "Burning Bush," raised by Mr. Hally, of Blackheath.

It was about this period, viz., in 1853 or 1854, that my attention was first directed to this subject. By fertilizing blooms of "Flower of the Day" with

pollen taken from the well known "Tom Thumb," I succeeded in raising a variety which was named "Culford Beauty." This was succeeded by several sorts of more or less merit, conspicuous amongst which was one called "Rainbow," which proved the most vigorous, and possibly the best of the silver-variegated zonals that had up to that time been introduced. This sort, however, fine as it was, was at last superseded by the more beautiful variety known as "Italia Unita," which, up to the present time, is perhaps not surpassed by any other silver-edged variety.

To return to the variety named "Rainbow," this variety was of a somewhat remarkable origin. One of my seedlings of that period was produced by an old, dark-zoned variety called "Cottage Maid," which had been fertilized by the pollen of "Kinghorn's Attraction;" and in the result, this one plant yielded me three distinct varieties, viz., "Rainbow," a silver-variegated zonal; "Empress of the French," a marbled-stemmed variety, in the way of "Cerise Unique;" and a dark-zoned, strong-growing sort, which was named "Emperor of the French," and which, like its great prototype or namesake, appeared destined to play a very important part in the development of its race, inasmuch as it was instrumental in originating the now famous group of Golden Variegated Zonal, or golden tricolor-leaved varieties, which at that time had not been heard of, and, in fact, were not then in existence.

About this time, 1855, it occurred to me that,

considering the great advance that had been made in the way of improving the silver-margined varieties of the Zonal Pelargonium, something similar might possibly be effected with the golden-margined sorts, or rather sort, for at that period I believe "Golden Chain" was the only yellow-margined variety in existence. As to the date of the origin of this variety, there may possibly be some uncertainty; but that it is a sport from Pelargonium inquinans I think there can be little reason to doubt. In a very interesting paper communicated to the Royal Horticultural Society by Mr. Wills, of Huntroyde, the origin of this variety is put at about 1844. But I am inclined to think that it originated long previous to this date, for I have been informed that the late N. S. Hodson, Esq., of the Botanic Garden, Bury St. Edmunds, was in possession of a somewhat large and apparently old plant of this variety as early as the year 1822 or 1823. I can myself testify that about the year 1847 or 1848 the late Mr. D. Beaton had commenced to use it with excellent effect as a bedding plant, at Shrubland, near Ipswich.

In the summer of 1855 I fertilized blooms of the old variety named "Cottage Maid" with pollen taken from "Golden Chain," and the result of this cross was two distinct varieties, both of them improvements upon their pollen parent. They were named respectively "Golden Tom Thumb" and "Golden Cerise Unique." During the following summer, blooms of the "Emperor of the French" were fertilized by the pollen of "Golden Tom

Thumb," and this produced a variety which was named "Gold Pheasant," a decided improvement upon its pollen parent, and inferior only to "Mrs. Pollock," which last, together with "Sunset," were the produce of the two following years, and were obtained between "Emperor of the French" and "Gold Pheasant," making the latter the pollen parent. Again, using "Emperor of the French" and some similarly zoned seedling varieties as the seed-bearing parents, and using pollen taken from "Mrs. Pollock" and "Sunset," the result was the production of the beautiful varieties named "Lucy Grieve," "Mrs. Benyon," "Lady Cullum," &c.

The admiration which these beautiful plants commanded would appear to have induced a host of enthusiastic cross-breeders to turn their attention to the subject, and as a consequence, the names of the Golden Variegated Zonal Pelargoniums of the present day, may be said to be legion. Still, from causes which I will hereafter endeavour to explain, many of the new varieties obtained have a want of vitality or constitutional vigour, which, I fear, will render them but ill adapted for the purpose of bedding plants.

Soon after the introduction of the Golden Variegated Zonals there appeared an entirely new tribe of Zonal Pelargoniums, which have been very appropriately named "Bronze Zonals," or "Gold and Bronze Zonals." They appear to owe their distinctive character to a cause similar to that which has produced the variegated varieties, viz., an abstraction of chlorophyll from their foliage; but in this case,



instead of the abstraction being confined to the margins, as it is in the variegated varieties, it equally affects, though to a less degree, the entire surface of the leaf, while the zone retains its normal intensity of colour. The disc and margin consequently present a uniform yellow, or rather pale green colour, which shows off to great advantage the brown or cinnamon-coloured zone. A cross between a Green Zonal and a Golden Variegated Zonal variety will generally produce a percentage of these plants; and they have certainly been very much improved by Mr. Wills and other raisers. They make excellent bedding plants, as their loss of green colouring matter has not to any material extent diminished their vitality or vigour. Some have erroneously considered them as variegated plants, which they obviously are not; and the Royal Horticultural Society has very wisely settled the matter, by deciding that they shall not be classed as variegated plants, for competitive purposes, at their exhibitions.

Of the origin of that section of Zonal Pelargoniums which is known as the "Nosegay" varieties I can afford but little information. They are chiefly distinguished by their narrow petals, and by their large trusses of bloom. "*Fothergillii*" may possibly be the earliest of this section. Loudon mentions it as a native of the Cape, but the date of its introduction to this country is not given, so that it probably is a garden hybrid or a sport from *P. zonale*; or it is equally possible that the forms which we now call

Nosegay varieties represent the earliest condition under which the species zonale was introduced, and that the broader-petaled sorts have been obtained by selection from them.

There are one or two variegated varieties of the Nosegay section which have been in cultivation for many years, and may have been secured as sports from some of the earlier of the green Nosegay varieties. One of the best or most useful of these is the variety known as "Mangles' Variegated." By taking this variety as one parent, and by attempting what I have considered to be judicious crosses, I have endeavoured to improve this class of variegated varieties, but I have not been able to make much progress in the matter. One cause is that "Mangles' Variegated" does not produce pollen by any means freely, nor is it easily induced to bear seed. I have, however, succeeded in securing some few varieties from it, one of which is named "Stella Variegata." What appears somewhat strange about this variety is, that it closely resembles sports which have from time to time been obtained from Beaton's well known "Stella," although one of the parents of "Stella Variegata" was a much older variety of the Nosegay section, known as "Mrs. Vernon." This I fertilized by the pollen of Mangles' variety, and one of the results was "Stella Variegata." From the "Stella Variegata" as one parent, taking sundry varieties of Beaton's improved Nosegays as the other, I have originated many curious and interesting varieties.

From the tendency which Beaton's "Stella" has

to throw out occasionally, under various circumstances and in various localities, variegated sports, it would appear to indicate that there is a strain of variegation in its ancestry, more or less remote.

Before closing my remarks upon this section of Zonal Pelargoniums, I may, in justice to the memory of the late Mr. Beaton, be allowed to say that the admirers of this class of plants are greatly indebted to him for the results of his persevering exertions in improving this now splendid class of bedding and conservatory flowers. He found the Nosegay section to consist of but few varieties, and these exceedingly coarse and unmanageable in their habit of growth, either as bedding plants, or as decorative plants for pot culture; and he has left them nearly all that can be desired, as every one whose duty or inclination it is to make the decoration of the flower garden, &c., his study, must at once admit,—witness the varieties called “Stella,” “Spread Eagle,” “Pink Pearl,” “Amy Hogg,” “Cybister,” “Indian Yellow,” &c. No doubt the group is still capable of further improvement; and if we are ever to have anything approaching a blue colour in the Zonal Pelargonium, it appears to me that it is in this particular section that its advent is to be looked for.

I am not in possession of any particular information with regard to the origin of the white-flowered Zonal Pelargonium. Several years since, at least as early as 1859, “Zonale Album” and “Ingram’s White,” both of them narrow-petaled, loose, Nosegay-like sorts, were in cultivation, and about

the same period there appeared one named "Auber Henderson," whose flowers were somewhat small, but of tolerably good form. All these, however, had little merit, except the novelty of colour in their flowers. They were followed by "Boule de Neige," "Niveum Floribundum," "Lady Turner," "Galanthiflorum," "Comtesse de Chambord," and "Miss Emily Field," all producing white or whitish flowers. About the year 1860, floriculturists were agreeably surprised by the introduction, from the Continent, of a Zonal Pelargonium of good habit, and producing pure white, broad-petaled flowers. This variety, which was named "Madame Vaucher," was, when introduced, and in fact still is, highly esteemed, as being a very distinct and useful kind; and since its introduction many other white-flowered sorts have made their appearance, although up to a very recent date it may be doubted whether, as a white-flowered variety, any great advance had been made upon the established favourite, which has been extremely useful, in union with the bright-coloured flowers, in producing many of the beautiful intermediate shades of colour in which the Zonal section is now so very rich. This variation of colour is, however, to some extent inherent in the race, since Miller describes the original Pelargonium zonale as of a purplish colour, and in subsequent editions of his book the varieties are said to be numerous, ranging through different shades of red to bright scarlet.

Shortly after the introduction of "Madame Vaucher," it occurred to me that this variety might be

advantageously used as a breeder, with the object of producing novel combinations amongst variegated varieties. As I have lately given an account of my experience in this matter, with its results, in a paper which I read at the meeting of the Royal Horticultural Society, at South Kensington, I will here quote from that part of it relating to the present subject:—

“Some years since, on the introduction of some of the better sorts of the white-flowered Zonal varieties, such as ‘Madame Vaucher,’ ‘White Tom Thumb,’ &c., all kinds having well defined zones, it occurred to me that if sorts with foliage similar to ‘Mrs. Pollock,’ ‘Lucy Grieve,’ &c., could be induced to produce pure white flowers, it would be a very desirable result. I immediately set about experimenting in the matter, but found the process to be much slower than I had at first calculated upon; and I fear, if I were to attempt to describe all my experiments and failures, that it would justly entitle my paper to be considered as tedious and lengthy. Suffice it, then, to say, that in four generations, I succeeded in producing plants having golden tricolor foliage, and pure white flowers; but these features were, unfortunately, accompanied by an exceedingly feeble constitution, and apparently by a strong determination on the part of the plants to leave this world as soon as they could, which, indeed, most of them succeeded in doing. However, I managed to persuade a few of them to live on, and one of these, now before you, is named ‘The Ghost,’ for it is only the ghost of what I wished it to be. But

the two first points have been gained, viz., tricolored foliage and white flowers; and the third point only is wanting, namely, vigour of constitution, the first step towards which is, I believe, successfully taken. The proof of this is now before you, in the variety named 'Eva Fish.'

"Two principles, it will be observed, had been active in tending to enfeeble or debilitate the constitutions of the white-flowered golden-tricolored race, that is, variegation itself, which always tends to diminish the vigour of any variety, and also what is called the 'in and in' system of breeding, which is known to have a similar effect in the vegetable, as well as in the animal kingdom. The method I have adopted to throw fresh blood, as it were, into the race, is as follows, and, as far as I can judge at present, I think that it is likely to prove successful.

"I selected one or two strong-growing silver-margined seedlings, having very light pink or nearly white flowers; these I fertilized with pollen taken from 'Madame Vaucher,' 'White Tom Thumb,' and some other green-leaved, white-flowered sorts. Most of the progeny proved green-leaved, though a portion of them showed variegation; but I selected a few of those which showed no symptoms of variegation whatever, and when they bloomed, they nearly all proved to have white flowers; these I fertilized with pollen taken from the variety named 'The Ghost,' and the result of this cross is the plant named 'Eva Fish,' and one or two other promising seedlings, which I have little doubt will produce white flowers."



## CHAPTER IV.

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### SPORTS AND SEEDLINGS.

ON this subject there would appear to exist something like confusion of ideas, inasmuch as some would appear to be inclined to designate all newly developed forms, or varieties, as Sports. This, however, in my opinion, is not correct, as I will presently endeavour to show ; although I admit that it does at first sight appear somewhat difficult to say what developments are really sports, and what are not.

That which I should be inclined to regard as a sport or *lusus naturæ* would be a simple deviation from the normal or established form and condition of any well known variety, spontaneously produced ; and I believe I may safely say that no method of cultivation, nor the application of soils, or stimulants of any description, has ever been known to induce a tree or plant of any sort to become variegated, or even to throw out a single variegated shoot or branch, or to produce double instead of single flowers. Still in nature these changes appear to be of frequent occurrence, though physiologists cannot assign a reason nor point out any cause to account for these mysterious alterations.

The converse of this opinion is, indeed, sometimes held. Thus, a clever plant-grower writes as follows : —“ Having found that in good soil variegated plants indicated a tendency to become green, and that in wet mould badly drained, green sorts had a tendency to throw up white shoots, I was led to try a few experiments. The first was in 1857. A plant of the “Cerise Unique” Pelargonium, which had been very unmercifully cut for cuttings, was selected for the purpose. It was pretty well furnished with snags—in fact, a good specimen of bad cultivation. It was planted out in June, deep enough to hide all defects. As autumn drew on my doubts began to rise, for not a vestige of white could be seen about it. I therefore took it up, potted it, and cut the head off it. In a few weeks afterwards I was encouraged on seeing, by five or six buds that had started, that some were green, some white, and one beautifully variegated : this I preserved, and propagated. Next year two or three plants of the same variety, which had been bedded out, were taken up and potted after the frost had killed their tops. Keeping bad treatment still in view, I would have nothing cut off them, and here, again, I got a sport similar to one which I obtained the previous year. I next took ‘Tom Thumb’ in hand, and from it I was surprised to get ‘Brilliant.’ I tried it again, and now I have got what I think is identical with ‘Silver King!’ I believe, therefore, that all the so-called Scarlet Pelargoniums may be altered in appearance in this manner. Whether this alteration be a disease or not, there is one very re-

markable fact connected with it worthy of Mr. Darwin's notice; that is, I have never got a green sport from a variegated plant like the green parent of the variegated variety. From 'Annie' the sport is like old 'Compactum;' from 'Brilliant' it has an upright habit, and becomes red with cold; and from the variegated plant I raised myself, alluded to above, it resembles 'Cerise Unique' in nothing but the flower."

When, however, the changes above alluded to do occur, from whatever cause, then it may fairly be said that a sport has developed itself. The next step is to secure a separate or independent existence for this development, which may generally be accomplished by the usual modes of propagation or increase, viz., by cuttings, or grafts, &c. This being secured, it is then in the hands of the hybridizer, or cross-breeder, an active agent in transmitting its peculiarities to its seminal progeny.

I have observed that seedlings frequently present themselves in an undecided or imperfectly developed condition; and although it is sometimes found that individual seedlings will come symmetrically variegated from the seed leaf, without showing any disposition whatever to revert to the green state, still, on the other hand, and in most instances, variegation is progressive. It develops itself more or less rapidly, and may, of course, be encouraged by judiciously checking or discouraging the development of that part of the plant which shows a disposition to become green. I think, however, that most raisers of these

plants will agree with me in saying that in general there is less difficulty in obtaining a green than in obtaining a variegated variety, from most individual seedlings. I have before alluded to the instance in which a seedling developed three distinct varieties, viz., "Emperor of the French," "Empress of the French," and "Rainbow," and the question might be asked which of these were seedlings, or which of them sports, without eliciting any very clear or distinct reply.

I think, however, it is but reasonable that some distinction or line of demarcation should be drawn between varieties secured from sports produced by established sorts, and those produced by imperfectly developed seedlings. I should, therefore, be inclined, for practical purposes, to consider as a SEEDLING any form or variety obtained from a young plant which had been produced from a seed, and which had not previously assumed a fixed or decided character, nor had been propagated, but was still growing upon its original roots. What I should regard as a SPORT or *lusus naturæ* would be any abnormal form, produced by an established variety which had been already propagated or increased by cuttings, &c., or even by a younger unpropagated plant, provided it was a decided break from the character it had first assumed as a seedling.

## CHAPTER V.

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### HOW TO PRODUCE VARIEGATED ZONAL PELARGONIUMS.

IN the directions I propose to give under this head, I shall merely detail, as it were, my own practice, occasionally assigning the reasons, or convictions, by which my practice has been guided, and pointing out as I proceed the failures I have experienced, as well as the successful results I have secured. It must always be borne in mind that I am writing for the information of the tyro, or the as yet inexperienced amateur in this interesting pursuit.

I will begin by describing, as well as I can, the different parts of the flower of the Pelargonium.

The flower of the Pelargonium, like that of other plants, is the part destined by nature for the purpose of reproducing the species, by means of seeds, and consists of certain floral envelopes, surrounding the sexual organs. The flowers are what are called hermaphrodite, that is, each blossom contains both male and female organs, and consists of the following parts, viz., the Calyx, the Corolla, the Stamens, and the Pistil. The use of the Calyx, which is generally of

a green colour, would appear to be that of protecting and supporting the more important and more delicate organs ; while the Corolla, which represents the element of beauty in the flower, in the case of the Pelargonium consists of five variously coloured petals.

The Stamens are the male organs, and in this genus are seven in number, of unequal length, viz., five long, and two short ; they are placed around the pistil, which, as is always the case, is placed in the centre of the flower. Each stamen consists of two parts, a filament and anther ; and within the latter, which forms a pouch or case, the pollen, or fertilizing powder, is secreted.

The Pistil is the female organ, and consists of three parts,—the ovary, the style, and the stigma. Within the ovary are formed the ovules, or embryo seeds. The style supports the stigma, and conveys the fertilizing powder, or pollen, which has been shed upon the latter to the embryo seeds contained in the ovary.

I will now suppose that it is the wish of the intending raiser of Variegated Zonal Pelargoniums to obtain during the spring and summer months a quantity of fertilized seeds, for the purpose of producing a crop of seedling Pelargoniums during the summer of the succeeding year, and I will also suppose that the obtaining of fine Variegated Zonal varieties is the desired object in view. Let a dozen or more of the finest Green Zonal varieties be obtained, and also a like or a smaller number of the



finest Gold and Silver Variegated Zonal sorts that are to be had. I will suppose them to have been all struck from cuttings during the months of August or September, and to be growing in pots, say, about four inches in diameter. They must be wintered in an ordinary greenhouse, giving the variegated varieties the advantage of a shelf near to the glass; and the temperature of the house must not be allowed to fall much below 45 degrees, as a minimum, admitting air, however, freely, when the weather will permit. Under this treatment the plants, both green and variegated, will continue to progress slowly during the winter months, and will require to be shifted into their flowering pots about the first week in February. The size of the pots for the Green Zonal varieties should not exceed six inches in diameter, and the same, or perhaps a size less, will be suitable for the variegated sorts; but great care must be taken that the pots for the latter sorts are well drained. They will all grow, and produce seed freely, in almost any moderately rich soil, avoiding peat, however; but I would recommend a soil composed principally of rotted turf, with the addition of a portion of leaf mould or well rotted manure. It is better to avoid a very rich soil, as great luxuriance is not desirable.

After they have been repotted, let them be well watered with a fine rose watering-pot, and replaced as before recommended, giving the variegated sorts, as being the most delicate, every possible advantage in regard to position, and keeping the house rather

close and moist for a week or two, after which abundance of air may be given when the weather is favourable; but at the same time, so as to avoid anything like cold draughts. Let the plants have water only when they really require it, and let the pots be frequently turned round, so that all parts of the plant may have equally the advantage of being exposed to the sun and light.

Early in the month of May most of the plants will be in flower, the variegated varieties as well as the green-leaved sorts. They may now be placed, in order to be operated upon, in some light and convenient position, such as the front of a greenhouse, or other light structure. Continue to give plenty of top air; but it will be advisable to keep the front lights closed, to avoid draughts, and also, to some extent, to exclude insects. A day temperature of not less than 70 degrees will be found necessary, or, at least, most conducive to sexual development; and at this season (June—July), this temperature can generally be maintained without the aid of fire heat, while, by closing the house somewhat early, in accordance with the state of the weather, the night temperature will seldom fall lower than 50 degrees.

The time may now be said to have arrived when the intending cross-breeder is called upon to exercise his judgment in the selection of the parents of his future seedlings; and this is perhaps the most important part of the whole business.

I have before observed that although the varieties of Variegated Zonal Pelargoniums already in the

country are exceedingly numerous, yet comparatively few of them will, I suspect, be found to be eligible as bedding plants, on account of their delicacy of constitution or deficiency of vital or growing power. Perhaps the principal cause of this, in addition to the admitted debilitating influence of variegation itself, is the practice of selecting variegated varieties for the seed-bearing parent, using the green-leaved varieties only as pollen parents. Without wishing altogether to condemn this practice, I would, nevertheless, in most instances, recommend a contrary procedure, viz., to make the green-leaved variety the seed-bearing parent, and to use the pollen of the variegated sorts, my conviction being that in the vegetable, as in the animal kingdom, the male is generally the most active in stamping the leading characteristics or peculiarities of its nature upon the progeny, while the constitution of the female is generally, to some extent, inherited by the offspring.

In referring to my own experience on this subject, I find that I have raised some pretty varieties from variegated seed parents ; but the most vigorous, and in all respects the best, I have raised, have been from green-leaved seed parents.

Another cause may exist, although of it I will speak with less certainty, and that is, the using indiscriminately the pollen produced by the short stamens. It will be recollected that the stamens of the Zonal Pelargonium are seven in number, five generally being long, and two always on very short

filaments, or sessile. These have sometimes been considered as sterile, or imperfect; but I have proved to my own satisfaction that the pollen produced by them is at least not always sterile; and it might perhaps be used with advantage if a dwarfing influence was considered desirable; but this is never the case with regard to Variegated Pelargoniums, as there is very little danger to be apprehended from producing them of an over robust constitution, and, consequently, the pollen produced by the short stamens may safely be dispensed with altogether.

Further, with regard to the selection of parents, the experimentalist must, of course, exercise his own judgment in the matter, bearing in mind the universal law of nature, viz., that like to a certain extent produces like, and that, consequently, the seedlings will in a greater or less degree resemble each of their parents.

To illustrate this, I will suppose that a cross is effected between a scarlet-flowered and a white-flowered Zonal Pelargonium. The seedlings will be found to vary with respect to the shade or colour of their blooms, some of them bearing more resemblance to one parent than to the other; but most probably no individual amongst them will be found to produce either scarlet or white flowers, but all of them intermediate colours—that is to say, lighter shades of red—showing that the seedlings have inherited more or less from both parents.

But in the production of Variegated Pelargoniums the foliage is, of course, more a consideration than

the flowers, although there is no necessity for altogether ignoring the latter, and, therefore, every means must be used to obtain the brightest and richest combinations of leaf-colouring. Now, in the golden-margined varieties, it is where the zone, or horse-shoe mark, overlays a portion of the yellow margin, that the brightest gleams of colour are brought out. In order, therefore, to encourage or promote as much as possible that their development should assume this desiderated character, it is advisable to select, as green-leaved parents, those varieties in which the zone is situated as near as it can be found to the margin of the leaves. This rule is also conducive to the production of a tolerably large disc, or centre of green; and without this latter condition no variegated variety will be of a very vigorous constitution.

With regard to the silver-margined varieties, this consideration is perhaps even more necessary to be attended to than it is with the golden-margined sorts, as their margins are more completely destitute of chlorophyll. Possibly it is from this circumstance that they are found unable to expand in proportion to the growth or expansion of the green centres—more particularly so when grown in the open air—and thus become necessarily crumpled in the centre of the leaf, which detracts greatly from their beauty. I am therefore inclined to think, in reference to this class of varieties, that if narrower margins can be secured, although it might not altogether remedy the defect, yet it might considerably ameliorate it; for, if it did not induce the leaf to present a flat

smooth surface, it would most likely compel it to assume a convex form, which would be preferable to a concave or crumpled surface.

Many other experiments will doubtless suggest themselves to the mind of the cross-breeder with regard to the improving and diversifying of the flowers, as well as the foliage, habit, and constitution of these interesting plants, concerning which it is not necessary in this place to offer further suggestions.

It will be observed that the anthers of a Pelargonium flower have generally burst, and the pollen, to all appearance become fit for the purpose of fertilization, a day or even two days before the stigma of the same bloom is in a fit state to receive its influence. This has induced me to doubt whether it frequently happens that any individual flower of the Pelargonium is fertilized by its own pollen, more particularly so when bloomed in the open air, and thus of course subjected to the action of the atmosphere, the interference of insects, &c.; and this may possibly be a provision of nature to promote variety. But, be this as it may, it does not apply to plants grown under glass in a quiet or still atmosphere, and where means are used, if found necessary, to exclude insects.

I have said that the anthers generally appear to arrive at a state of maturity before the stigma does so; but it must be borne in mind that in a still atmosphere the pollen will remain upon the anthers, and no doubt retain its fertilizing properties for



several days. So, to prevent the possibility of self-impregnation, it is quite necessary to carefully emasculate each bloom intended to produce seed *before the anthers have shown any indications of bursting*. This operation, which must be performed with great care, is very easily accomplished, with the aid of a small pen-knife or a pair of small scissors, the anthers being rubbed or cut away; while, at the same time, any injury to the stigma is carefully avoided.

This being done effectually, the stigma will, in the course of another day or two, be in the proper state or condition to receive the influence of the foreign pollen, which may easily be known by observing when the five points of the stigma are somewhat reflexed, and its surface covered by a glutinous or gummy secretion. Then the pollen, being carefully applied with a camel's-hair pencil, readily adheres, and in the course of a few days, if impregnation has been effected, the seed-vessel will be observed to increase in size, and the seeds, generally five in number, will show themselves to be clinging, as it were, to the base of the style, which rapidly elongates, and assumes the form which may possibly have suggested for the genus the English name of Stork's Bill. After this fertilization has taken place, the floral envelopes or petals will generally drop off; although this is not always the case, as in some instances, and under certain conditions, the petals will adhere until the seeds are nearly ripe. It will be readily ascertained when the seeds approach the condition of

ripeness, by observing the change which takes place in their colour, viz., from green to brown, and by the feather-like appendage with which each seed is furnished beginning to separate itself from the elongated style to which it has adhered, and of which it seemed to form a part. The seeds are to be carefully secured as they ripen, otherwise they will be apt to use the wing with which nature has furnished them, and convey themselves away to various localities, in order to establish themselves in a position to commence life, as it were, on their own account; but as this exemplification of independence may not be in accordance with the wishes of the manipulator, it is advisable to secure them as they ripen, and keep them in a dry place until the time arrives for sowing them.

And this, of course, may be done at any time; but I prefer to sow about the middle of August, or should there be any portion of seed not ready to sow by about that time, I should recommend deferring the operation until the beginning of the February following.

But I shall suppose the seeds ripe and ready to sow by the middle of August. If so, procure the requisite number of ordinary seed-pans of about a foot or ten inches diameter, or, in their absence, six-inch pots will do equally well; let these be carefully drained with pieces of broken pots, and place a thin layer of moss or cocoa-nut-fibre refuse upon the drainage. Then sift a quantity of light, turfy soil, lay an inch or rather more of the rough portion of this soil upon

the moss or fibre, and fill up the pan or pot to within an inch of the rim with the finer sifted portion ; press this moderately firm, and make it quite smooth and level, and on this surface sow the seeds quite thickly, only taking care that one seed does not overlies another. Next, with the bottom of a small pot or a flat piece of wood press the seeds firmly into the soil, and let them be just covered, but no more, with a portion of the finely sifted soil. The sowing completed, place the pans in a cucumber or melon pit or frame, and let them be well watered from the fine rose of a watering-pot, to settle the soil, and induce the seeds to vegetate. The pans should be shaded during hot sunshine.

In about ten days, less or more, the seeds will have nearly all vegetated, and the pans may now be removed to a more airy structure, such as the front of an ordinary greenhouse, care being, however, exercised to avoid placing them in a cold draught ; and, indeed, it may be advisable to discontinue for a time the practice of admitting air by the front lights. When they have been in this situation about a fortnight the seedlings will be sufficiently robust to admit of being handled, and if the seeds were perfect they will be standing very thickly in their pans or pots. It will also be seen that they are in what is called the seed leaf, that is, the transformed or expanded cotyledons form their only foliage ; and on a close and careful examination many of these cotyledons will be found to exhibit yellow or white marks upon their surface. These marks are the first, and they are sure indi-

cations of variegated foliage. A considerable portion of the seedlings, however, will also be found to have no marks upon these primary or seed leaves. It becomes, therefore, necessary to call to mind that the desideratum is VARIEGATED varieties, and as those seedlings which exhibit no marks upon their cotyledons will, in all probability, never throw out any variegation, every green-leaved individual should without remorse be pulled out, taking care, while this "massacre of the innocents" is being effected, to avoid injury to those which show the required variegation.

This being accomplished, the remainder will have more room to grow; and to settle the disturbed soil, let them be carefully watered with a fine-rosed pot. They will now rapidly progress in growth, but may be allowed to remain in their present pans, and in the same situation, until about the end of September or the beginning of October, when it will be necessary to transplant, or "prick them out," as it is technically called, into pans or pots filled with soil, similar to that which was recommended for the sowing the seeds. Let them be carefully pricked out into these pans, at about  $1\frac{1}{2}$  or 2 inches apart, and watered as before recommended; then shaded, kept somewhat close, and frequently sprinkled during the next fortnight, after which they may be placed upon a shelf near the glass, in any ordinary glass structure where frost and damp can be excluded, and should receive water only when they really require it. In this situation they may be allowed to remain during the winter months.

About the middle of February they should be potted singly into pots of about three or four inches in diameter, using a somewhat light and not over-rich soil; and after this time they may be treated in all respects the same as ordinary bedding plants. About the last week in May they may be planted out in the open border, in rows about 18 inches apart, and one foot from plant to plant.

They may, however, if it be desirable, be grown and proved in pots; and if so, I should recommend that early in May they should be shifted into pots of not less than six inches' diameter, kept in a pit or greenhouse until about the end of May or beginning of June, and then plunged to the rims in cinder ashes in the open air, exposed to sun and rain. It will be an advantage to make provision for protecting them from heavy thunder, from rain, or from hail-storms.

If it should be equally convenient, I would prefer that the seedlings should be planted out in the open border, where they will speedily develop their various peculiarities under more natural and favourable circumstances than in any other position. All that they now require will be an occasional examination, in the course of which it will be found that many of them are producing green as well as variegated shoots, and it will become advisable to stop the strong-growing green shoots, without, however, entirely removing them, with a view to the encouragement of the variegated portion of the plant.

About the end of July or the beginning of August

the variegation will in many of them be found to be sufficiently established to admit of one or two cuttings being taken from them; but do not by any means cut away all the variegated portion of any plant at this stage of its growth, as, if so, the probability is, that it may produce no more variegation; and as it is possible that the cuttings may not grow, in such case the variety, however valuable, would be lost. Whenever, therefore, the variegated cuttings cannot well be spared, it is safer and better to take none from the plant during the first season of its existence, but to encourage the development of variegation by the gradual removal of green shoots, should any such be produced.

About the last week in September, let the plants be taken up, and carefully potted in good light soil, in pots of not less than six or eight inches' diameter, in accordance with the size and condition of the plant. Let the plants so potted be placed behind a wall, so as to be shaded from the sun, and let them be sprinkled with water once or twice a day for about a week or ten days, or until the foliage shows that the plant has recovered from the check produced by the removal from the soil in which it was growing away freely.

Early in October let the plants be placed under glass, and kept slowly growing during the winter months. To accomplish this it must be remembered that a high temperature is by no means necessary nor desirable, and air ought to be freely admitted whenever the weather will permit. The day temperature



of the house should not be below 58 or 60 degrees, and the night temperature should not fall much below 45 degrees. Let water be freely given when required, but not till then. By pursuing this treatment, or something approximating to it, the plants will, by the beginning or middle of February, be in a fit state to be cut up for cuttings; and when these are fairly rooted, the variety may be considered to be secured, and the old or seedling plant may be thrown away.

Some time since the Editors of the *Gardeners' Chronicle* suggested to the growers of Variegated Zonal Pelargoniums the probability of producing new varieties by inoculation; and this ingenious idea is certainly well worthy of consideration. The influence which the stock exercises upon the scion with regard to vigour, productiveness, &c., is sufficiently well known; and that a robust or vigorous scion has been proved to exercise a beneficial or invigorating influence upon a delicate or unhealthy stock must also be admitted. But I believe that there is no instance upon record of the scion having, in any degree, affected the specific character of the stock upon which it grows; inasmuch as when suckers are produced upon the stock of a Peach or Pear tree, they are still found to be unaltered in their specific character, and remain always the original plum or quince, as the case may be, although the descending sap of the peach or pear may have circulated through their vessels for years. It would, therefore, appear that it is chiefly in regard to consti-

tutional vigour, or productiveness of fruit, or flowers, that the stock and scion exercise a reciprocal influence upon each other. This conviction does not, however, preclude the possibility of variegation, which is a mere variation of the plant, and not a specific difference, being produced in the stock by the influence of the scion or graft. I copy the following remarks on the subject from the *Gardeners' Chronicle* :—

“ We alluded some time ago to certain cases of variegation induced by inoculation, and suggested that the growers of Variegated Zonal Pelargoniums should look to this as a means of procuring some choice things in this way. The idea which thus presented itself has been in some degree realized. ‘ In the nurseries of Messrs. Ballantyne and Son, Dalkeith,’ observes a northern contemporary, ‘ there is now to be seen a variegated Geranium raised in the following manner :—A strong upright sport of that old green-leaved favourite, Glendinning’s Seedling Scarlet Geranium, was grafted two or three months since with that popular quadricolor, “ Mrs. Pollock,” which “ took ” somewhat imperfectly, but lived for five or six weeks, when a bud presenting the appearance of variegation was observed to protrude from the old stem, at from five to six inches under the graft. The partly adhering “ Mrs. Pollock ” was then removed, so as to encourage the growth of the young shoot, which is now growing freely, and may be described as a first-class bicolor, or white and green-leaved geranium.’ ”

For my own part, however, I feel by no means sure that "Mrs. Pollock" was in any way responsible for this production. The cases of the Breadalbane Ash, and the Chelsea Jasmine, cited on another occasion by the same authority, are more in point. In these the insertion of a variegated graft so inoculated the stock, that it broke out subsequently in the form of a permanently variegated sport. At all events, the matter is worthy of being followed up and investigated, more particularly as there is so little difficulty attending it. Those who wish to try the experiment have only to graft a few green-leaved Zonals, either seedlings or propagated plants, during the months of February or March, with some of the best Gold or Silver variegated varieties, at, say, a foot or more from the surface of the pots; to check over-exuberance of growth, and to take care that the shoots, which will be sure to be more or less freely produced from the stem below the part where the scion is inserted, are closely watched, and any deviation from the original character of the stock carefully preserved, and propagated.

The operation of grafting the Variegated Zonal Pelargonium is very easily performed about the time I have mentioned, viz., February, or early in the following month, by merely cutting a slice from the stem of the stock about  $1\frac{1}{2}$  or 2 inches in length, the part sliced off to be set at liberty by a horizontal cut at the bottom. After cutting the scion to fit as nearly as possible to the stock, bind them together with a piece of bast; no clay or wax is required.

Let the plants be kept in a somewhat close atmosphere, and for some time shaded from sunshine; the scions' will soon adhere and grow vigorously; but be in no hurry about removing altogether the bast ligature which binds them to the stocks, as in that case their increasing weight may possibly separate them therefrom. It will now be interesting to watch the productions from the stems, below the part where the variegated scions are inserted. There is this to be said further in favour of making the experiment, that should after all no choice new varieties be evolved through the process, at least some nice standard plants of introduced sorts will be secured, which will be worth more than the trouble which has been bestowed upon them.

Since writing the above I have seen an extract from an essay "On the Circulation of the Sap," by R. Bradley, F.R.S., Professor of Botany in the University of Cambridge, dated 1757, which shows that the idea of producing variegation in the foliage of plants by inoculation is by no means new. The learned Professor says "that the Turkish method, which has been lately introduced, of inoculating for the small-pox, has furnished me with many hints which tend to further discovery of the circulation of the sap in plants;" and he details some results of grafting the "Brazil Jasmine" upon a plant of the common variety, whose leaves were very heavily blotched with yellow. The "Brazil Jasmine" by this means, he says, "is so extremely tinged with yellow that there is hardly any green to be found in

its leaves, by which it is evident that the poisonous juices which occasioned the blotches in the 'Common Jessamine' have, by circulation, mixed themselves with the healthful juices of the 'Brazil Jessamine,' and have spread the distemper over the whole."

It does not, I think, appear quite clear that this can have been a case in which variegation had been induced, but it would rather lead to a belief that a scion of the "Brazil Jasmine" (whatever that may have been), had been grafted upon an unhealthy plant of the common variety, and eventually the scion, like the stock, became also unhealthy, an event by no means unlikely to have occurred.

But the following is more decided. The learned Professor goes on to say:—"We find, by enarching or inoculating a variegated common jessamine, whose leaves are edged with white, into either the plain common sort or the Spanish jessamine, on the Indian or Brazil kinds, that the malignity which causes the whiteness in the leaves of the first mixes itself in such a manner with the juices of the plants it is engrafted upon, that their leaves become infected and tinged in some places with white colour, which, in my opinion, is a plain demonstration of the sap's circulation; nay, if we put only a bud of the variegated sort into a plain jessamine, ten or twelve feet above the ground, the poison will reach the branches next the root, as well as those which are at a great distance above it." And he adds, "If we design to communicate the infected juices in great abundance to any plant we have a mind should become striped, the

method now in practice is, to choose such stocks to bud or enarch upon as have their leaves edged, which, as I have said before, are thoroughly distempered, and therefore are most capable of infecting the fresh plants inoculated or enarched upon them. A single bud or eye placed in the escutcheon of the distempered tree, where it can only receive its nourishment from the vitiated juices, will become variegated in proportion as it draws that nourishment more or less, and will partake more of the yellow or white juice than if a branch were to be enarched, because the bud has nothing to nourish it but the juices of the plant it is inoculated upon; but by enarching the scion is fed both by the striped plant, and a plant of vigour which causes less striping."

The learned Professor evidently considered that variegation could be communicated from the scion to the stock, and also that the stock would communicate or transmit it to the scion. If this interesting discovery was made by or was known to the Professor more than a century since, it seems strange that so little advantage should have been taken of the knowledge of this fact during the many years which have since elapsed. However sound or otherwise the doctrine may have been which he taught with regard to the circulation of the sap, I must confess myself somewhat sceptical as to the results of his experiments in producing variegation. A writer in the *Farmer*, who quotes from the Professor's essay, and who may possibly have more faith in his doctrine than I can profess to have, suggests that Fortune's



yellow winter-flowering Jasmine, "*Jasminum nudiflorum*," might by similar means be induced to become variegated, which would render its foliage no less attractive during the summer months than its flowers are in winter; and he also thinks that an equally desirable consummation would be the variegating of the evergreen "*Cotoneasters*," which might possibly be accomplished by grafting them with or upon some variegated member of the rosaceous family.

Alluding to the Geraniaceæ, he points out the desirability of transmitting the quadricular variegation of such varieties as "*Lady Cullum*," "*Lucy Grieve*," "*Italia Unità*," &c., to the agreeably scented and delicately cut-leaved varieties, such as "*Lady Plymouth*," "*Prince of Orange*," &c. But whether anything of this kind can or cannot be accomplished by inoculation I am unable to say. If the results mentioned by the Professor be truthfully reported, and should it be found to be within the limits of possibility to obtain by inoculation results similar to what has been recorded above, it will at once open a vast field to the experimenter, out of which, with the abundant material now at his command, extraordinary results may with confidence be looked for. Where variegation in the foliage was the primary or only object of the cross-breeder, it may now be said that his "*occupation is gone*," as nature limits his operations, and as it were says, "*Thus far mayest thou go, but no further*;" but with regard to the operation of grafting or inoculating, this being purely artificial, it may frequently be found that a temporary

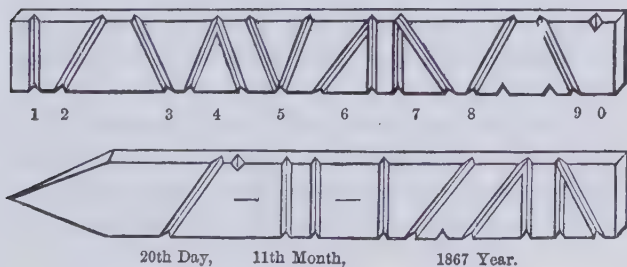
union may be effected between species to some extent remote from each other, but which union may possibly be found to be of sufficient duration to transmit (using the words of the learned Professor) the *malignity* which causes the whiteness in the leaves.

As before stated, I have no experience in this matter further than having found that the variegated varieties take very freely when grafted upon the green-leaved sorts. I have now before me a green-leaved Zonal Seedling Pelargonium, on which was grafted some nine or ten months since several variegated varieties, both gold and silver-margined, all of which took equally well, and all are now growing fairly, the scions having been inserted at about two feet from the surface of the pot. This plant has already formed a well balanced head, representing a union of gold and silver variegation; but, contrary to my expectations, no shoots, either plain or variegated, have as yet been produced from the stem, which, as I have already said, is quite two feet in length.

Whether it may or may not be possible to produce variegated Pelargoniums by inoculation is, after all, a question of minor consequence, as the nursery-men's voluminous catalogues sufficiently attest that by other means they can be produced in abundance.

Some importance has been attached to the desirability of keeping a correct pedigree-book relative to the production of these plants. I admit that I regard this to be of minor importance, although it is, no doubt, very interesting and very desirable to be in possession of the information which a correctly kept book of this sort would necessarily contain. But as

every raiser will be sure to adopt his own views with regard to the keeping of such a book, it will be unnecessary for me to offer any suggestions upon the subject, further than to say that whatever system may be adopted, reference must necessarily be had to numbers of some sort attached to the plants themselves, or to the pots in which they are growing. I would therefore call attention to Seton's system of numbering, recommended by the late Mr. Loudon, as the simplest, quickest, and most comprehensive method of numbering that I am acquainted with, though it does not appear to be so well known, nor so frequently adopted, as it might have been expected to be, on which account I will describe it here in as few words as possible. Each figure is represented by a single and distinct cut, and no number, however high, will require more cuts to express it than would have been required of figures, had it been written by a pen. It is to be borne in mind, however, as a rule, to read always from the bottom, or the sharpened end of the tally stick, because it is obviously necessary for the operator to hold that end in his hand while cutting the numbers.



## CHAPTER VI.

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### ON THE PROPERTIES WHICH CONSTITUTE PERFECTION.

It is very desirable that the raisers or producers of Variegated Zonal Pelargoniums should have before them something like a "beau ideal" of a perfect variety as a standard by which the results obtained can be measured. I will, therefore, for the benefit of my readers quote from the *Gardeners' Chronicle*, 1867, p. 515, some very pertinent remarks upon this subject, together with a "code of properties," by which to judge of the merits of individual varieties. The remarks are, I believe, from the pen of Mr. Thomas Moore, one of the able editors of that periodical:—

"From the vast number of new varieties springing up around us of what have hitherto, for want of a better name, been called Tricolor Zonate Pelargoniums, but for which it seems to us better to adopt the more correct appellation of VARIEGATED ZONAL Pelargoniums—a number which, moreover, is likely soon to become overwhelming, unless some means of

limitation can be found, it has become most urgent that a code of 'properties' should be adopted, by means of which those sorts which approach the nearest to ideal perfection may obtain the prominence which they merit, and may not be swamped in the flood of rich leaf colouring by which we and they are alike threatened. The production of these 'things of beauty' must not be discouraged, nor must any of them be lightly despised. They all are charming, and it would be a sin to destroy any of them ; but, on the other hand, it is quite obvious that the least attractive should be least widely distributed ; and we may go further, and add that so long as they are sufficient to meet the demand, the best only should be extensively propagated and circulated.

"It may be long before we attain to any standard of perfection that may be set up, for colour is a fickle element, and must enter largely into the estimate in this case ; but still we should have the standard before us, and work upwards and onwards till we reach it.

"Now, in judging according to the following rules, we ought first to separate the real from the ideal, and allow equal marks, say 15 for each, making a total of 30 for those which reach the standard. The *real* would include the points numbered 1 to 3, perfection in any one of which would consequently secure 5 marks for that point. The *ideal* would include the points numbered 4 to 8, and when perfection in any of these is attained, there would be 3 marks for that point. While, in the meantime, a

lower number would be awarded in proportion to the degree in which the idea of perfection had been therein realized. Supposing our essential points to be themselves correct, and they are the result of a very careful study of the subject, it must with their aid be an easy task to find out which are the best sorts, namely, those which come nearest the standard.

“1. The plant must be of vigorous constitution, free-growing, but not long-jointed.

“2. The habit must be stout, close, and branching, and the branches thickly furnished with horizontally set, well displayed leaves.

“3. The surface of the leaves must be flat, that is, neither concave nor convex from contraction of the margin.

“4. The leaf-colouring must be bright, distinct, and well defined.

“5. The ground colour (green) must occupy a space in the centre equal in diameter to the combined zone and marginal belt, *i.e.*, half the diameter of the leaf; it must be of uniform hue, and must not extend into, nor appear beyond, the zone.

“6. The zone must be either evenly arcuate, or regularly scalloped or vandyked, dark on the inner, and brightly coloured on the outer edge.

“7. The inner portion of the zone, to an extent not exceeding one-half its whole breadth, must be dark-coloured throughout (blackish or deep brownish red), breaking outwardly in a symmetrically radiated manner into the bright colour (red or pink) of the outer



half, which latter must at no point break through the dark belt so as to touch the ground colour.

“8. The marginal belt must be of uniform breadth, and of the same tint throughout (yellow, straw colour, cream colour, or white), entirely separated from the ground colour, or from contact with the darker belt of the zone.”

## CHAPTER VII.

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### PROPAGATION AND CULTIVATION OF VARIEGATED PELARGONIUMS.

THESE popular plants being so very easily propagated or increased, it may almost seem superfluous to say much upon this part of the subject; but when they are required in quantity as bedding plants, for which purpose it is unnecessary to say that they are in all respects well adapted, it becomes very desirable to know the mode of propagating them with the greatest rapidity, and with the least possible loss of material. Having had some experience in increasing them in almost every conceivable manner, I must give a decided preference to the plan of inserting the cuttings in the open border, as by that method a less percentage of cuttings is lost than by any other mode with which I am acquainted. One condition is, however, necessary, and that is, that they must be inserted not later than the first week in August; if it can be done earlier, so much the better. I am aware that the difficulty of obtaining cuttings at this early period must prove an objection to this method. Still, if a few plants of each variety can be spared after the

flower beds have been filled, let them be planted in a favourable position, in moderately rich soil, as early in the season as is consistent with their safety, and let them be regarded only as a sort of reserve for possible exigencies; and if not required, or if not all required, to be cut up for cuttings by the beginning of August. This will prevent the necessity of having recourse to the flower beds at so early a period.

I will suppose that a quantity of stout cuttings are obtained by the first week in August. Let them first be prepared in the usual manner, and then select a border, or any other piece of suitable ground fully exposed to the sun, and if the soil be somewhat light in character so much the better. Let it be well dug and carefully pulverized, then spread upon the surface an inch or more of a mixture of sand or road-scrapings, and well rotted leaf mould not less than two years old. Let this be well incorporated with the original soil. This latter operation will be best performed with a steel digging-fork; in doing it avoid as much as possible treading upon the soil, which may now be raked quite smooth and level, and with a measuring rod, or some similar piece of wood, mark the surface out into lines across the border, at about nine inches apart. Then with a setting stick or small dibber, make holes along the lines indicated by the mark of the rod, at about three or four inches apart, and two or three inches deep, and into each of the holes pour a small quantity of silver sand, and insert the cuttings so that the end of each cutting will rest upon the sand. Press the soil gently against

the cuttings, and proceed in the same manner with the next line, using a piece of board or plank laid across the border on which to tread while performing this operation.

When all is finished, water well with a fine rose, to settle the soil about the cuttings. After this, water again when required, and keep them free from weeds. Nothing more will be required, until the end of September or not later than the beginning of October, when they may be raised and potted into pots about four inches' diameter, in which they may remain until planting-out time arrives. It will probably be found on lifting them, that not one cutting in a hundred has failed to grow.

Another method may, however, be pursued, and it is one which is generally found to answer very well, viz., to insert a single cutting in the centre of a three-inch pot, as follows :—Let the pots used be perfectly clean inside and outside ; place a small piece of broken pot upon the hole at the bottom of the pot, and on this place an inch of cocoa-nut fibre ; fill up the pot loosely with light, turfy soil, which has passed through a half-inch sieve ; insert a setting stick or the finger into the loose soil until it reaches the fibre, pour a small quantity of silver sand into the hole thus made, and on this sand place the end of the cutting, and press the soil gently to it to steady it, and keep it in its place.

When this is done, place them upon cinder ashes in a cold pit or frame ; give them water, and keep them close for about a week, when the lights may be

drawn quite off, so as to fully expose them to the sun, as well as to the night dews and gentle rains, but at the same time to be in readiness to be replaced, in the event of heavy rain or thunderstorms, &c.

Supposing neither of the methods I have recommended be adopted, cuttings of these plants may still be rooted as late as the beginning of October; and it is hardly safe to allow variegated Pelargoniums, which are intended to be preserved, to remain in the beds after this time. So I will suppose the plants to have been removed from the beds for the purpose of being potted, and before doing so it will be necessary to prune or trim them somewhat into form, in order to render them more compact and manageable while they are placed under glass for protection during the winter months. If a large number should be required, let all the trimmings be made into cuttings; but before inserting them, allow them to lie in a shed, or other dry place, for at least twenty-four hours, to allow the end of the cutting to dry, and, to some extent, to heal over. By using this precaution at this advanced period of the year, it is found that they are less liable to rot, or to damp off, as it is called.

Prepare now the necessary quantity of pots, of about four inches' diameter; let them be carefully drained, and on the drainage lay about an inch of cocoa-nut refuse; fill up the pot loosely, somewhat higher than the rim, with light, sifted, and very sandy soil; make two holes with the finger in the loose soil in each pot, close to its side, and pour into

each hole a small portion of silver sand; on this sand place the end of the cutting, and press the soil moderately firm down about it. Let the cuttings now be watered, and then placed upon a shelf in a temperature of about 55 or 60 degrees, giving more water when required, but keeping them rather dry than otherwise. At this late period, I would recommend placing them upon shelves, in preference to placing them upon bottom heat, and it will be found that by doing so fewer cuttings will be lost by damping or rotting at the base. When the cuttings have fairly rooted, more air may be admitted to them whenever the weather will permit, and the temperature may be allowed to decline considerably. Early in February the plants growing in one pot may be separated, and each plant repotted singly into a four-inch pot; while the cuttings, which were struck in August in three-inch pots, might now, with great advantage to them, be shifted into four or five-inch pots. It will be found, when the time for bedding out comes round, that fifty plants so treated are of more value for that purpose, than a hundred which may have been allowed to remain for many months in very small pots.

It will also be found that the plants which were taken from the flower beds early in October, and potted, pruned, and placed in gentle warmth at that time, are now in a condition to furnish an abundant supply of cuttings, which will root readily in three-inch pots, one cutting in each pot, treated as before recommended. The old plants, after being well cut



back, may be allowed to remain in warmth for another fortnight, more or less, to induce them to break or shoot afresh. It will now be about the beginning, or, at least, during the early part of March, and the plants may now, together with the autumn-struck cuttings, be placed in cold pits or frames, where they will merely require protection from frost, &c. Towards the end of the month, or beginning of April, the cuttings inserted about the first week of February will be ready to be placed along with them, to remain until they can with safety be bedded out.

When it is desirable to cultivate the Variegated Pelargoniums in pots for decorative purposes, and for the purpose of exhibition, &c., let some of the most promising plants be selected from the autumn-struck cuttings, or from the plants which have been repotted from the flower beds in October. These should be shifted about the middle of February into pots, one size larger than those they have been wintered in, and should be grown upon a stage as near the glass as possible, and in a temperature not lower than 45 degrees, as a minimum. Let them be frequently turned round, to expose all parts of the plant alike to the influence of the solar light, and in order to get them properly balanced. Carefully avoid over-watering, and slightly syringe them on the afternoons of fine days. Avoid by all means placing them in a cold draught, which is fatal to their prosperity, and on that account it is advisable to admit no air as yet by the front lights.

Early in May they may be shifted into six-inch pots, and some of the strongest of them into pots about eight inches in diameter, using a somewhat rich soil, composed of turfy loam, enriched with a small portion of thoroughly rotted hotbed manure or leaf mould. They may now be placed upon cinder ashes in a cold pit or frame, kept somewhat close, and slightly shaded, for a fortnight or so after having been shifted, and should then be very gradually inured to full exposure to sunshine, gentle rains, &c., the sashes, however, being always in readiness, so as to protect them from violent thunderstorms or hail, as well as from heavy or prolonged rainfall.

A few of the shoots may now require to be topped, or they may be staked, or tied down to the rim of the pots, in order to lay the foundation, as it were, of a specimen plant. In the training of the plants, however, avoid using more stakes than are absolutely necessary.

By the end of June or by the beginning of July the plants ought to have become beautiful objects for exhibition, or for the decoration of the drawing-room or conservatory, &c. Such plants are also well adapted for suspending by wires, in ornamental baskets, in the last-named structure, or in the open air; for it must be remembered that the more they are exposed to light and air, the more brilliant will be the tints of their leaf-colouring.

When it is desired to have large specimens of these plants in pots, select early in October from amongst those plants which have been grown in

eight-inch pots during the summer months some of the most promising, and let them be set free from their stakes and ties, and their straggling shoots, if any, cut somewhat back, the balls of earth slightly reduced, and the plants repotted into pots a size less than those they had previously occupied. Winter them in a temperature not under 45 degrees, keeping them near to the glass, and watering them very sparingly. Early in March the pots will be found to be full of roots, and they may now be shifted into pots ten or twelve inches in diameter. These pots must be perfectly clean, and the drainage, which must occupy a space of not less than one-fourth the entire depth of the pot, must consist of a piece of broken pot placed upon the hole in such a manner as not to prevent the escape of water; or, what is perhaps still better, take what is called a thumb pot, and with a file make four or five notches in its rim, and invert it over the hole in the bottom of the large pot, and around this lay a few pieces of clean broken pots, and on these, again, pieces of charcoal, of about the size of filberts, to the depth before mentioned. Over this should come a thin layer of sphagnum, or moss. Let the soil used be a tolerably stiff, turfy loam, slightly enriched by a portion of well rotted hotbed manure, these being well mixed, and the finer portions sifted out, using a half or three-quarter inch sieve. The rougher portion of the soil is to be used for the bottom, and only a small portion of the fine siftings to finish off the surface. They should be potted rather firmly, using a small wooden rammer to consolidate the soil,

which ought, consequently, to be rather dry when used. Water somewhat sparingly at first, but let the plants be slightly syringed and kept rather close for the first fortnight or so after being shifted. Early in June they may be placed on cinder ashes in a pit, or frame, where the lights can be drawn entirely off, only to be in readiness, as before recommended, to protect from hail, or very heavy rains.

Some of the varieties, from their compact, bushy habit of growth, will require but little attention as regards staking or tying, while others, of more loose or straggling habit, may about this time require to be attended to in this respect; but it must be borne in mind that the fewer stakes and ties used, consistent with the proper formation of the specimen, the better; and as I have recommended the use of a somewhat stiff soil, combined with firm potting and ample drainage, and as the plants will be, of course, in the second year of their growth, it will be found that the leaves produced will not be so large as those of the same plants produced during the former season, but they will have the advantage of increased brilliancy.

I have not recommended stimulants, such as surface dressings or liquid manures of any sort, not considering that this will often be found necessary; but in cases where the pots are found to be well filled with healthy roots, and it is undesirable to shift the plant into a larger pot, although desirable that the growth or development of the specimen should not be retarded, there can be no objection to using any

moderately rich liquid manure occasionally, taking care, however, that this is properly diluted and allowed to become quite clear before it is given to the plants.

So far as regards the use of Variegated Zonal Pelargoniums as bedding plants for the flower-garden, the essential properties may be summed up in these points—namely, (1) vigorous constitution, (2) flat leaves, and (3) bright, well defined colouring; the most objectionable features being coarseness of habit and concavity of foliage. When, however, these plants are cultivated as a specialty, and more particularly when grown as a fancy collection of pot-plants, the proportions between the various colours in the leaves insisted on in the above code of properties will be found to add very greatly to the beauty of the plants.

## CHAPTER VIII.

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### VARIEGATED AND BRONZE ZONAL PELARGONIUMS FOR THE PURPOSE OF WINTER DECORATION.

IN the foregoing pages these interesting plants have been considered chiefly as regards their adaptability to the purpose of decorating the flower-garden, and as pot-plants for the conservatory and greenhouse, during the summer months, and also for the purpose of exhibition.

It would indeed be difficult to overrate their merits as bedding plants. This all must admit who have witnessed the splendid effect produced by them during the last few seasons (in connection with other fine-foliaged and flowering plants) in various public and private horticultural establishments throughout the country.

But an extended acquaintance with them has also resulted in the discovery of other and very desirable properties possessed by them—viz., their great value as objects for winter decoration. A knowledge of this circumstance may have induced some raisers and growers of these plants to object to the practice



of judging of their respective merits in accordance with what they term the "Bedding Plant Standard."

Possibly, on a second view, there may be found to be less in this objection than may at first sight appear; and I confess myself still inclined to adhere to this mode of selection. And although we may hesitate before recommending the annihilation of a "thing of beauty," it must, nevertheless, be remembered that those "things of beauty" are now exceedingly numerous, and are likely to be ere long much more so. And this circumstance, I think, renders necessary care and scrupulosity in the selecting of varieties for perpetuation. And I am certainly unacquainted with any variety of these plants which succeeds well as a bedding plant that is being possessed of a sufficiently vigorous constitution to enable it to endure with impunity the vicissitudes of our climate, or, in short, to thrive in the open air, but what will make a much better pot-plant for either summer or winter decoration than those varieties whose delicacy of constitution does not enable them to successfully withstand this ordeal.

And when debility or lack of constitutional vigour exists in a variety, no amount of cultural skill, or stimulants in the shape of soils or manures, will ever enable such variety to compete successfully with the more robust sorts.

This being the case, I think that it is very desirable that weakly varieties should not be introduced to the public, and thereby avoid as far as possible giving cause for dissatisfaction or disappointment. But in

cases where delicate or weakly seedlings develop distinct and desirable peculiarities in either foliage or flowers, by all means let them be carefully preserved; and by judiciously employing them as pollen parents, as I have before recommended, those desirable features or peculiarities can generally be reproduced in their descendants, accompanied by improved constitution.

It is very frequently repeated that the delightful effect produced by the various tribes of bedding plants (and to which effect these ornamental-foliaged Pelargoniums have of late years in no small degree contributed) should be of so short duration as only to be enjoyed for some four months out of the twelve; this fact must of course be admitted. But it is satisfactory to find that, under the protecting influence of a glass structure, the interesting developments and beautiful leaf-tints of these charming Pelargoniums can be watched with equal, or it may be increased, interest throughout the entire winter and spring months.

Anything in the shape of either flowers or foliage which tends to enliven the monotonous aspect of a garden or plant structure during the winter months, must necessarily be acceptable. And there are perhaps few recent introductions which go further towards supplying this desideratum than those ornamental-leaved Pelargoniums, which, when judiciously interspersed with the ordinary inmates of the conservatory or greenhouse, and with forced flowers, bulbs, &c.—and, if the structure be at all lofty, when suspended in wire or other ornamental baskets (light

and air being essential to the full development of their beautiful leaf-tints)—certainly produce a very pleasing effect, and tend to lighten up or illuminate, as it were, the entire structure.

These beautiful plants are no doubt exceedingly useful for the purposes I have just mentioned. Still it is in a structure entirely devoted to the purpose of growing them as a collection that the most charming and unique effect is to be produced. And I confess myself sanguine enough to believe that possibly the day is not very far distant when a "*tricolor house*" (if I may use that term) will be considered as an indispensable adjunct to every extensive horticultural establishment.

Those who have had the pleasure of seeing a structure exclusively devoted to this particular purpose during the winter and spring months, and containing a well-assorted collection of these plants in healthy and vigorous condition, will, I think, be willing to admit that it is a sight to be seen once, and to be thought of and dreamt about for a long time afterwards.

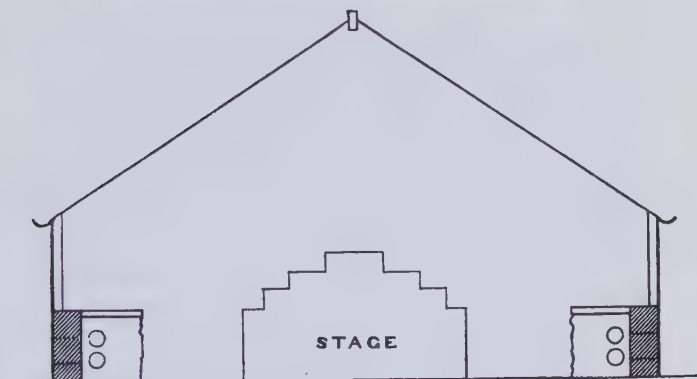
To successfully cultivate these plants during the winter and early spring months, it is quite necessary to observe and adhere to a few simple conditions, which I will endeavour in as few words as possible to point out.

And in the first place, I will assume that it is the intention of the cultivator to devote a house or an erection of some sort exclusively to their accommodation. This structure may be a "lean-to," or, what is

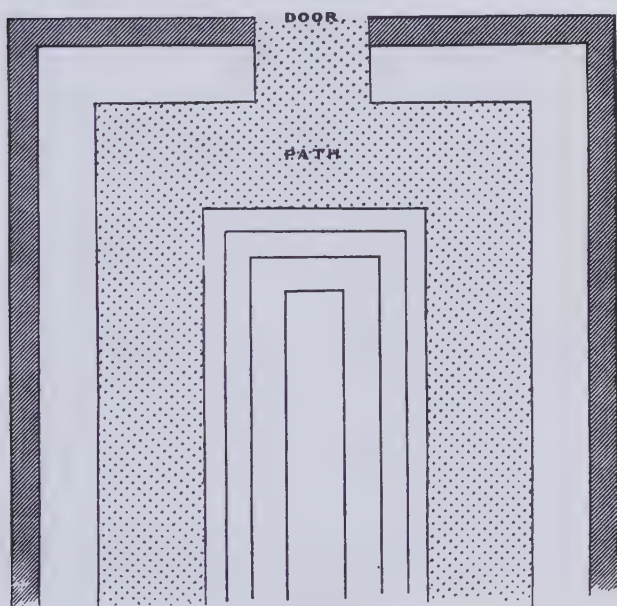
much to be preferred, a span-roofed house or pit. It may, of course, be of any desired dimensions, and it is by no means necessary that it should be lofty, but rather the reverse, as it is desirable that the plants should be so placed as to be looked down upon, otherwise their beauty will to some extent be concealed.

The house devoted to the accommodation of the magnificent collection of these charming plants in the establishment of the Messrs E. G. Henderson & Son of the Wellington Road, St. John's Wood, is a span-roofed structure of considerable dimensions, being some 60 feet long by 20 feet wide, and 10 feet high in the centre or highest part. But this is of course much larger than would usually be required for a private collection. Still, a structure in which to thoroughly enjoy the beauty of these interesting plants ought to be sufficiently capacious and roomy as to width of doorways, paths, &c., as to admit of freedom and comfort in attending to and examining the plants, as it will readily be admitted that it greatly detracts from the pleasure which ought to be derived from the contemplation of the beautiful in nature or in art, to be compelled to do so in a constrained or uneasy position, or in an atmosphere or temperature rendered uncomfortable by an excess of either heat or cold.

The accompanying sketch will give an idea of what I consider a suitable structure to contain a collection of these plants during the winter and early spring months, or throughout the entire season if desired.



SECTION



GROUND PLAN



The ends of the house should, if possible, face north and south, and ought to be about 17 feet wide, and of any desired length. The doorways and paths should be upon or not under the ground-level, and not less than 3 feet in width. The height of the centre of house, 10 feet, and at the sides, 4 feet 6 inches—viz., 2 feet 6 inches glass, placed upon 2 feet of 9-inch brickwork. The side lights to be hinged at top, and the lower sides attached to an inch or inch-and-quarter iron rod, which must extend to the entire length of the house ; and the turning of this rod by aid of a lever and ratchet-wheel, gives any desired amount of air, as far as the side lights are concerned. Wood or slate ventilators ought also to be placed in the brickwork, to be opened and closed in a similar manner to that recommended for the glass side lights. The air admitted by these ventilators, coming as it must necessarily do in direct contact with the hot-water pipes, will be found to be all that can be desired for winter ventilation, when the glass side lights may be kept mostly closed.

Openings in the roofs of span-roofed houses for the purpose of ventilation are always expensive and inconvenient, and in most cases quite unnecessary ; so that the roof of such a structure as I am recommending may be entirely fixed, and on the apex of which, outside, the rollers may be fixed for blinds, should they at any time be found necessary. It has already been said that the doors should not be less than 3 feet wide, and the door-studs should be ex-



tended to the roof ; and the space enclosed by them above the doors to be occupied by lights, which should be fitted, and made to open freely, so as to admit air at both ends of the house at the highest possible points. And this, with the side lights and lower ventilators, will be found to be, under all circumstances, ample ventilation ; as, when the end ventilators are both opened, a movement in the internal atmosphere of the house instantly commences, let the length of the structure be what it may ; and no danger whatever need be apprehended from a stagnate or over-heated stratum of air.

The side shelves, being 2 feet 3 inches in width, may be formed of slate, iron, or wood (and under which the hot-water pipes should be placed), and ought to stand at a height of 2 feet, or not exceeding  $2\frac{1}{2}$  feet, above the level of the pathway. The lowest step of the stage, it will be perceived, is to be upon a level with the side shelves ; and it may be found necessary to have the roof supported by wood or cast-metal columns, springing from the top of the stage.

Should it, however, be considered desirable to devote a house of considerably less dimensions than that which I have endeavoured to describe to the winter culture of these plants, I would still recommend a span-roofed erection for the purpose, constructed upon as light and elegant a principle as might be considered consistent with strength and security. Let the path be in the centre of the house, and fully 3 feet wide ; and the shelves on which the

plants are to be arranged on either side, at a height of 2 feet or  $2\frac{1}{2}$  feet above the level of the path.

Ornamental brackets might be placed on any available spaces on which to place choice specimens; but I would not advise the placing of a shelf under the apex of the roof, as is sometimes done in similar structures to what I am describing, as this tends to throw an injurious shade upon the lower or principal shelves, and it also detracts from the beauty of the structure itself, which ought, of course, to be provided with the necessary means of affording the required temperature, and also that of thorough ventilation; and this can be accomplished in a manner in all respects similar to what has been already recommended for the larger erection.

Preparations for furnishing a house such as I have endeavoured to describe with the necessary supply of suitable plants for winter and early spring decoration, ought to commence early during the previous spring, say about the middle of February or beginning of March, when a careful selection of plants should be made from the various suitable sorts which had been struck as cuttings during the previous autumn; and if comparatively large specimens are also desired, let a selection be made at the same time from plants which had occupied the flower-beds during the previous summer. Let all be shifted from the pots in which they are growing into pots one size larger, and treat them, as regards soil, drainage, &c., in all respects as has been recommended in Chapter VII.

Early in the month of May following, they may be placed in cold pits, keeping the plants pretty near to the glass, and giving abundance of air when the weather is at all fine; and early in the month of June, should the weather continue favourable, they may be fully exposed, night as well as day, having, however, means of protection always at hand, should it at any time be required to protect them from thunderstorms, or from heavy or incessant rainfall.

Continue to give small shifts from time to time, as may be found to be necessary, up to the end of August; and, as will be seen in Chapter VII., ample drainage is recommended.

This condition I would still more earnestly insist upon in preparing plants for winter display. It is also advisable to remove flower-trusses as they appear, their development tending to the exhaustion of the plants, and the desideratum being the production of healthy and highly-coloured foliage, the effect of which is not enhanced by the presence of their flowers; so, as regards plants for winter decoration, it is advisable to eschew them altogether.

Use every possible means to keep the plants steadily progressing, and carefully avoid anything approaching a check, either from want of water or from any other cause. Continue to stop over-luxuriant shoots, and, by the aid of stakes, regulate and train others, in order to lay, as it were, the foundation of well-formed specimen plants; and when they have had what is intended to be their last shift, some of the strongest shoots may be tied, or in some other

way neatly fastened, to the rim of the pots ; and the use of stakes may now in a great measure be dispensed with. Indeed, by judiciously selecting plants from varieties most suited for the purpose of winter decoration—viz., sorts known to possess a stiff, bushy, and compact habit of growth—and avoiding those of loose or straggling habit, very little staking will generally be required ; and this is a desideratum, as the use of stakes must be admitted to be a necessary evil at the best.

The soil to be used for the last or final shift for the season ought to be composed principally of rich turfy loam, further enriched by about one-fifth part of well-rotted hotbed manure ; let this be well mixed and laid under cover some time previous to being used, in order to become somewhat dry, and when about to be used sift out the fine portion of the soil. Using for this purpose a fine or quarter-inch sieve, reject the portion so sifted out, and add to the rough portion (more or less, according to the quality of the loam used) a portion of sharp sifted road-drift or silver sand.

When the compost or prepared soil is sufficiently dry, and in a proper state to use, let the plants be potted moderately firm, and in addition to ample drainage, which has been already insisted upon, it might also be advisable to introduce amongst the soil used a few pieces of charcoal about the size of walnuts ; more particularly should this practice be adhered to in cases where anything approaching a large shift is intended.

Frequent repottings have been recommended, with

a view to prevent any check to the progressive development of the plants, but at the same time over-potting should be carefully avoided.

For a final shift it will seldom be necessary to use pots exceeding eight or at most ten inches in diameter, as large specimens can be grown in pots of this size; and it is quite possible that well-grown plants in pots of some six inches diameter will be found to be the most useful of any, being of convenient size for table decoration, or for similar purposes.

And such plants of the best-habited and most vigorous varieties can generally be produced from autumn-struck cuttings, as has been already recommended, or even from cuttings, inserted early during the following spring. In cases, however, where it may be desirable to grow plants into large specimens, pots of corresponding size must necessarily be used.

About the middle of September, or soon after that period, the plants ought to be placed in the house intended for their reception, and arranged according to the taste of the cultivator.

They will of course require careful attention as to water, &c., and the position of the plants ought to be occasionally varied in order to keep them duly balanced; and after this period avoid the frequent wetting of the foliage, or if it be found necessary to occasionally use the syringe to remove dust or other accumulations, let it be done on the mornings of fine days, when air can be freely admitted to dry up all before night sets in. Give during each day abund-

ance of air when the state of the weather will admit of doing so, but always carefully avoid placing the plants in a draught, which is exceedingly prejudicial to their wellbeing. By careful treatment, such as I have endeavoured to recommend, the plants will continue to progress steadily, and will, if the weather keeps moderately fine, require little or no artificial heat until about the last week in October.

After this period, solar influences being rapidly diminishing, it will be advisable to use very moderate fires daily, more with the view of dispelling damp than to increase the temperature, which ought not to be allowed, however, to fall much under  $55^{\circ}$  as a minimum, nor to exceed  $60^{\circ}$  unaccompanied by abundance of air.

It will be remembered that in Chapter VII.  $45^{\circ}$  is mentioned as a minimum, but in that case the object in view is merely to preserve the plants in a state of health, but of comparative inaction; while the desideratum in this case is vigorous though moderate progression.

A high temperature, particularly at this season of the year, is by all means to be avoided, as tending to produce attenuation, and foliage deficient in colour; while a cold and stagnant state of atmosphere induces damp, disfigurement, and loss of foliage. But by maintaining a temperature, &c., similar to what I have recommended, by judicious admission of air whenever the external atmosphere will admit of this being done, and by a diminished supply of water during sunless weather, the plants will be induced



to progress slowly, and to continue to develop their beautiful leaf-tints, somewhat subdued in intensity, "it is true," as compared with their more gorgeous midsummer array in the open air, but by no means less interestingly beautiful.

And as far as regards the silver-margined section of Variegated Zonals, it is possibly only under conditions as above described that their beauty is most strikingly developed ; as when cultivated in the open air (should the weather prove in any degree cold or wet) their foliage is apt to become somewhat crumpled, from the contraction of the colourless margins—and this circumstance detracts greatly from their beauty ; but under the protection of glass this defect does not occur, and the leaves maintain a perfectly flat or level surface, while in the many fine varieties of this section, the well-defined and richly-coloured zone comes out to great advantage.

And as regards also the "Bronze Zonal" and "Yellow Self" sections of Pelargoniums, although they are not variegated, they are nevertheless justly regarded as ornamental-foliaged plants ; and nearly all of them are found to be exceedingly useful for the purpose of winter decoration, and their presence in the collection tends in no small degree to produce a charming diversity or variety.

Altogether I am inclined to think that the "*tricolor house*" during the winter and spring months will be found to be one of the most enjoyable as well as most interesting structures in a horticultural establishment, in consequence of the striking beauty



of its inmates, their entire dissimilarity to all other ornamental plants, their ever-varying aspect, and the vast variety of shades of colour presented by their foliage, as developments succeed each other; and in some measure, also, in consequence of a circumstance too important to be by any means overlooked or lightly estimated—namely, that the temperature and atmosphere most favourable to their culture, and to the healthy development of their uniquely-ornamental foliage, is also precisely that most suited to the health and comfort of the majority of their cultivators and admirers.

## CHAPTER IX.

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### DESCRIPTIVE OF THE BEST VARIETIES OF VARIEGATED AND BRONZE PELARGONIUMS.

THE striking beauty of those plants, combined with the interest (which sometimes approaches fascination) inseparable from the circumstance of being the active agent in the production of new organisms in the shape of distinct and desirable varieties which had no previous existence, and the development or production of which may possibly be regarded as the closest approximation to creative power, and also to the facility or ease with which, in most instances, the desiderated object is effected, have, as might have been expected, induced a host of careful and persevering experimentalists to turn their attention to the subject of hybridisation or cross-breeding; and the consequence, as far as these plants are concerned, is, the introduction of a vast and rapidly-increasing number of varieties, which, to the keen perception and educated eye of the experimenter and connoisseur, are each possessed of a more or less distinct amount of individuality. Indeed, from their heterogeneous origin, it is quite possible that no two

individual seedlings has been, or perhaps ever will be, produced, which will be found to be in all respects precisely and exactly alike. Yet, as may naturally be supposed, the less experienced eye of their ordinary admirers and cultivators fails to recognise the distinguishing characteristics of many introduced varieties, and complains reasonably enough of an unsatisfactory amount of sameness exemplified in very many so-called varieties.

This circumstance has induced me to devote a chapter to the purpose of describing a selection of these plants, which it is hoped may be found to comprise the best and most distinct varieties introduced, or about to be introduced, to the public.

Every care has been taken to render this list as accurate and as reliable as possible, although, from their rapidly-increasing number, it is of course quite possible that some meritorious varieties may be inadvertently omitted; still it is confidently hoped that it may prove useful to amateurs and others who may be desirous of forming or adding to their collections, but who may not have had sufficient opportunities of seeing and examining the many introductions in order to be able to form an opinion of their respective merits, and to select accordingly.

The great or principal attraction of these interesting plants is of course confined to their highly-ornamental foliage; and their flowers, although in most instances possessed of good form and substance, are nevertheless, by most growers, considered of secondary or even of non-importance; consequently they are

not alluded to in the following list, unless in cases where they are characterised by some distinctive peculiarity in colour, form, size, or profusion.

The various varieties of ornamental-foliaged Pelargoniums will be found divided into three distinct classes or sections—viz., “Golden Variegated Zonals,” or “Golden Tricolors;” “Silver Variegated Zonals,” or “Silver Tricolors;” and “Bronze Zonals;” and each of these classes are also supplemented by a short list of varieties to which the above terms do not exactly apply, as in their case the zone is either entirely absent, or so faintly defined as to be nearly if not altogether invisible; and these varieties, if not in all respects so ornamental as the zoned sorts, are nevertheless exceedingly useful as bedding plants, and for this particular purpose they are by some growers preferred to them.

They will be found described respectively under the terms of “Golden-margined,” “Silver-margined,” and “Yellow Selfs.”

#### GOLDEN VARIEGATED ZONALS OR GOLDEN TRICOLORS.

*Mrs. Pollock.*—This variety is too well known to require description; it is, however, entitled to consideration on account of being the earliest introduction of this now popular race of ornamental plants.

It is still regarded as a first-class bedding plant, and is worthy of a place in the most select collections.

*Sunset*.—Regarding this variety the same may be said. It is somewhat less vigorous in its habit of growth, and is in all respects distinct from Mrs. Pollock, and from them are doubtless descended the entire race of Golden Variegated Zonal, or Golden Tricolor Pelargoniums.

*Lucy Grieve*.—One of the most beautiful tricolor-leaved varieties, exquisitely figured by a brilliant surface-zone of lake-tinted crimson upon an under bronze ground, with very rich golden margins; excellent for winter decoration, and also as a bedding plant.

*Sophia Cusack*.—A beautiful and very effective variety, with bright-flamed scarlet zone upon a broken bronze border, bright golden-yellow margins; makes a fine, compact pot-plant, useful for winter decoration and as a bedding plant.

*Sophia Dumaresque*.—A fine, robust, and vigorous variety, freely branched with rich golden-margined foliage, effectively marked by a brilliant flame-tinted zone; a very fine bedding plant, excellent for winter decoration; altogether a very desirable variety.

*Lady Cullum*.—A variety uniquely beautiful by the remarkably broad and rich leaf-zones, its ample rich bronze crimson ground-tints being intensely suffused and bordered by a brilliant flame-colour, maintaining its effect throughout the season, alike under glass or in the open air; it may be considered as one of the very best of bedding plants, and is equally well adapted for pot-culture during the summer, for exhibition, or for winter decoration.

*Spanish Beauty*.—A dwarf-growing variety, broad pure lemon-yellow margins well defined, dark-bronze leaf-zone, overlaid with a bright-flamed scarlet tint ; a very picturesque and effective variety.

*Fairy Spell*.—A beautiful and very effective dwarf-branching variety, with well-expanded leaves of circular outline ; the green disc belted with a bronze zone, finely belted and barred with carmine scarlet upon a broad rich canary-yellow leaf-margin.

*Humming-Bird*.—In the style of Lady Cullum, with sub-erect robust growth and evenly-expanded leaves of good substance, marked by a broad metallic zone of bronze, margined with rich flamed crimson in summer ; picturesque and distinct in character by its violet rose tints during the winter months.

*Howarth Ashton*.—One of the very finest varieties ; exceedingly rich and beautiful in its markings ; leaves of circular outline, and of great substance, with well-proportioned and rich golden margins ; the disc surrounded by a broad bronze zone, brilliantly suffused with flamed scarlet ; growth vigorous and free, retaining its rich leaf-tints throughout the year ; an improvement in the way of "Lucy Grieve ;" excellent for pot-culture, for the purpose of exhibition, &c., also for winter decoration, and will no doubt be found to be an excellent bedding plant.

*Lady Sheffield*.—This is a great improvement upon "Sunset," and is altogether a very fine variety ; leaves even and of good substance, and circular outline ; rich golden margins, finely contrasted with brilliant zones of flamed scarlet. It is of free growth, and will prove

a splendid bedder, and well adapted for pot-culture and for winter decoration, &c.

*Countess of Craven*.—An even and well-defined broad margin of clear golden yellow, with rich crimson and bronze zone; habit compact and vigorous.

*Sunray*.—Leaves of good substance, somewhat convex; broad dark-brown zone, barred with deep red; small disc of bright green, with narrow margin of bright golden yellow; close, compact, and vigorous in habit; altogether a very fine variety for pot-culture and winter decoration, and likely to prove a fine bedding plant.

*Illuminator*.—Large leaves with broad edge of clear yellow; very broad zone of bright chestnut red and black; habit free and compact; a very fine variety.

*Jetty Lacy*.—This is a very pretty and much-admired variety; leaves neatly margined with rich golden yellow; broad zone of rich crimson and chestnut red; of vigorous growth and compact habit.

*Beauty of Surrey*.—Margin of leaf rich yellow, with zone of brilliant carmine red, and dark brown or black; centre small, and bright green; a very distinct and novel variety.

*Earl of Derby*.—Foliage of medium size, with very broad zone of dark chestnut red and black; very small green disc, and narrow margin of rich yellow; habit compact and vigorous; a large portion of the leaf being composed of zone, it may be expected to prove an effective bedding variety, as well as being well adapted for pot-culture.



*Mrs. Benyon*.—A fine bedding variety, with leaves of great substance, having very rich golden margins; dark zone shaded red; flowers rich scarlet, and produced in great abundance.

*Mrs. Eyre Crabb*.—Foliage with a deep or broad margin of bright lemon-yellow; conspicuous vandyked zones, richly barred or belted with bright-flamed carmine.

*Emma Cheere*.—A miniature variety in growth, with well-expanded leaves, marked with a medium vandyked zone of flaming red, and rich golden yellow leaf-borders.

*Ada Mann*.—Dwarf-growing variety, of medium vigour; rich cinnamon-bronze zone, belted and barred with light flame-colour; and broad lemon-yellow leaf-margins, with very pretty pink flowers.

*Rustic Beauty*.—This is a novel and distinct variety, the flower being clear white; the habit of the plant is dwarf and compact, leaves roundly lobed, with a light flame-coloured zone, and bright lemon-yellow leaf-margins.

*Achievement*.—Large bold foliage, slightly convex, of free growth and compact habit; zone broad, colour intense black and rich bright crimson, with neat margins of deep yellow; presenting altogether a brilliant combination of colour.

*Glory of Dulwich*.—Foliage of medium size, round and well formed, with broad and beautiful-coloured zone of orange-red and brown, with wide and bright yellow margin; altogether an excellent variety.

*Vivid*.—Leaves flat and of very good form; broad

zone of dark brown and carmine; the colours very distinct; habit compact and branching.

*Resplendent*.—Foliage of medium size, flat and nearly circular; zone very broad; colour rich brown-red, shot with cherry-red, even yellow margin; this is a very fine and very distinct variety.

*Edward Milner*.—Centre of leaf bright green; the zone is bright flame-colour on black, and the margin clear gold.

*Beautiful for Ever*.—One of the most brilliant-zoned varieties in its group, of fine form and substance; altogether very effective; bright carmine-scarlet zone of great width, and belted by a proportionately broad bright yellow margin; will prove a grand competition plant, and excellent for winter decoration.

*Beautiful Star*.—A distinct and very effective variety; leaves well defined by even substance and outline; zone rich flamed-red, and of great breadth, upon a bright lemon-yellow leaf-margin.

*Countess of Ashburnham*.—A very beautiful variety, in advance of "Howarth Ashton" by its more vigorously-branched habit and finely-expanded leaf-growth of great substance, and even circular outline. Its brilliant carmine-scarlet zone is outwardly margined by a pure golden border. A fine variety for competition, winter decoration, and as a bedding plant.

*Eastern Prince*.—An effective variety, with well-defined rich carmine-crimson zone and golden-yellow

outer leaf-margin; leaves of good outline and substance; habit vigorous and compact.

*Mrs. Gladstone*.—A very beautiful and distinct variety, of compact close habit, well-defined circular even-surfaced leaves, and zone of rich carmine crimson, outwardly belted with a golden-yellow border; a very fine exhibition variety.

*Peter Grieve*.—A robust-growing variety of excellent habit, with slightly convex, smooth, and well-rounded leaves, a vandyked fiery zone, and leaf-margins of rich yellow. In point of habit and shape of leaf this variety marks a decided advance. It gained first prize at the Special Pelargonium Show, held at South Kensington on 22d May 1869, as the best golden tricolor introduced, thirty-four varieties competing for this much-coveted prize.

*Star of the West*.—Olive-brown zone, belted with rich carmine, outwardly margined with a rich lemon-yellow leaf-border, of vigorous and compact habit, with even circularly-lobed leaves and velvety-crimson flowers.

*Victoria Regina*.—In all respects an exceedingly fine variety, of strong and robust habit of growth, broad golden leaf-margins, and proportionate bright flame-crimson zone; leaves of fine size, substance, and outline. Retaining its good habit throughout the season, it is found to be invaluable for winter decoration, and one of the most effective of bedding plants.

*Crown Jewel*.—Centre of leaf green, with a well-

defined zone of bright carmine approaching to scarlet, surrounded by a deep margin of clear yellow ; habit robust and vigorous. Either as a bedding plant, or for pot-culture, this may be regarded as a first-rate variety.

*Sunrise*.—Centre green, with bright red and claret zone, the margin remarkably broad, and of a clear canary yellow, changing to sulphur ; habit compact and close-jointed.

*Queen Victoria*.—Centre deep green with yellow margin, red and bronze zone, good habit, and a very free grower.

*Mrs. Dix*.—A fine free-growing vigorous variety, with broad rich bronzy zone, in the way of "Lady Cullum."

*Sir Robert Napier*.—This is a very distinct variety, having the darkest and broadest black zone of any sort yet produced. The zone is indented with brilliant scarlet vandyke blotches, and deep golden margin, flowers clear flesh-colour, with rose centre.

*Mrs. Dunnet*.—A splendid variety, of very compact habit, and flat salver-shaped leaves, with intensely dark zone.

*Prince of Wales*.—One of the very finest varieties ever produced, of vigorous habit, and the leaf-colouring intensely brilliant ; will prove a grand variety for exhibition, &c.

*Sultana Valida*.—A splendid variety, something in the way of the "Prince of Wales," but with a very bright straw-yellow margin ; will also prove a fine exhibition plant.

*Plutarch*.—Leaves large, round, and smooth ; very

flat, and of stout leathery substances; small green centre, with broad black zone, illuminated on outer edge with scarlet crimson; regular margin of bright yellow; very free growth; hardy and robust.

*Rouge et Noir*.—Leaves of medium size, green centre, with narrow black zone, surrounded with bright red, succeeded by a broad margin of deep yellow.

*Red Admiral*.—Leaves green, with black and crimson-scarlet zone, the crimson-scarlet colour predominating; a beautiful variety; free, hardy, and very effective.

*Prince Silverwings*.—A seedling between “Mrs. Pollock” and “Stella Variegata;” a unique and exceedingly beautiful variety; centre of leaf green, black and red zone, with pale-yellow margin, changing to white or straw colour.

*Bright Eyes*.—A fine picturesque variety, of dwarf compact growth, having well-defined leaves of good substance and outline; zone beautifully vandyked, the colour being flamed crimson, with pure golden-yellow margin; will prove a fine competition variety.

*Glistening Sea*.—A very ornamental variety, with a broad golden-yellow leaf-margin, and well-defined narrow zone of bright carmine; leaf of good substance and outline; habit dwarf and compact.

*Happy Thoughts*.—Bright cinnamon-red zone, richly shaded and barred with rose carmine; leaf-margin pure canary yellow; habit free, dwarf, and compact.

*Watch Tower*.—A dwarf variety, of vigorous and compact growth; well-defined brilliant-flamed crim-

son zone, and rich golden outer leaf-margin ; leaves of good substance and outline.

*Reticulatum*.—A nosegay variety, with large trusses of rich scarlet flowers, similar to the well-known variety, “Stella ;” the foliage shows a dark-shaded zone, and the entire surface is marked by a beautiful tracery or network of golden veins upon a green ground, similar to the “*Lonicera Aurea Reticulata*,” or Japanese Honeysuckle. This is the only instance of this form of variegation in the Pelargonium family, and may possibly be the forerunner of a new and distinct section of ornamental-foliaged plants.

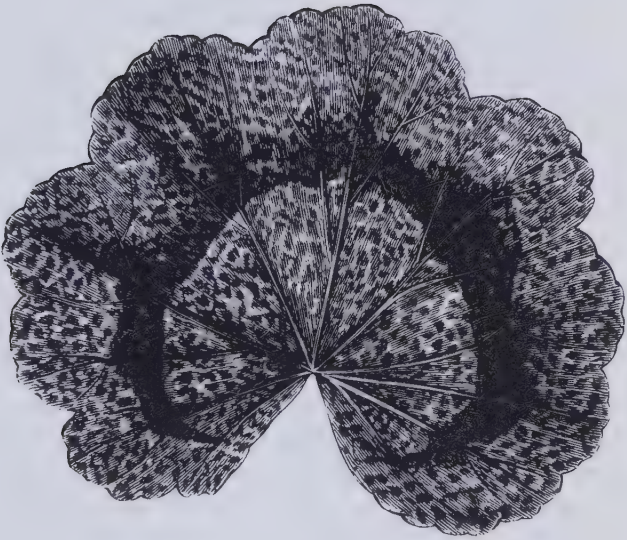
#### GOLDEN-MARGINED.

*Golden Chain*.—A very old and well-known variety, and is still found exceedingly useful for marginal lines, &c.

*Reine d'Or*.—A very distinct variety, with large dark-green leaves, edged with a narrow thread of bright yellow.

*Crystal Palace Gem*.—Irregular-shaped green disc on centre, with rich golden-yellow margins ; a great improvement upon “Cloth of Gold ;” the flowers are rosy scarlet. This is an excellent bedding variety.

*Golden Harkaway*.—Glossy rich green leaf-discs, and uniform golden margins ; orange-scarlet flowers ; the plant being of miniature growth, is well adapted for small beds or marginal lines.



GERANIUM "RETICULATUM."





SILVER VARIEGATED ZONALS OR SILVER  
TRICOLORS.

*Italia Unita*.—Zone of bright carmine-rose colour; scarlet flowers, with white eye; a very beautiful variety for either pot-culture or as a bedding plant.

*Caroline Longfield*.—An improvement upon “*Italia Unita*,” leaf-margins white, and the olive-coloured zone margined with brilliant carmine rose; flowers scarlet; habit of growth good.

*Italian Beauty*.—Foliage white margined, rich olive-tinted black zone fringed with rose; flowers scarlet, with white eye.

*Silver Cloud*.—A compact and very free-growing variety, with well-expanded foliage; bronze zone, finely belted and barred with flamed rose colour; flowers rich scarlet.

*Charming Bride*.—Robust free habit, with rich bronze zone, barred with bright rose carmine; flowers brilliant rich scarlet, with white eye; fine truss; a splendid bedding variety, and a very fine pot plant.

*Constance*.—A free-growing variety, of compact dwarf habit, evenly-expanded leaves, with bronze zone, finely belted with rose, and beautiful pure white leaf-border.

*Banshee*.—Margin of leaf rich cream; zone pink lake; large foliage; free and compact habit of growth; flowers cerise scarlet; good truss, and free bloomer.

*Mrs. John Clutton*.—Of a very striking and pleasing character, the broad bright crimson zone being

well defined, and the white edge clear and distinct, with a good deep green centre; habit dwarf and free.

*Duchess of Sutherland*.—Sulphur leaf-margin; zone bright lake; habit very robust, branching freely; beautiful colours, very distinct and remarkable.

*Mrs. Dombrain*.—This variety has a very narrow margin of cream colour, the edges of the leaves being serrated, and the colours following the leaf-formation gives it the appearance of a fringe; the zone is purplish lake; the plant is of vigorous habit, and will prove a good bedding variety.

*Peri*.—Leaf-margin silvery white; foliage large, with good-sized zone of bright lake; habit of plant strong, free, and compact; a very bright and lively variety.

*La Vestale*.—Delicate creamy-white margin; zone lake pink; light-green leaf-centre, rendering the plant peculiarly chaste in colour and distinct in character; large scarlet flowers; large truss.

*Exquisite*.—A very beautiful variety, with pure silvery-white margins and exquisitely-coloured broad zone of bright rosy lake and brown; the centre is ample, and of a peculiar bluish green; foliage large and growth free.

*Miss Burdett Coutts*.—For depth of colour this variety is pre-eminent; the margin is creamy white, tinted with blush; broad zone of rich purple crimson of the brightest hue; the habit is free and robust.

*Sparkler*.—Margin of silvery white, zone of vermillion-lake and dark brown; of free growth and compact habit.

*Sunny Smile*.—A very beautiful variety, with a bright well-defined rosy carmine zone; leaves medium size; good substance and outline.

*Flying Cloud*.—Rosy carmine zone, belted with pure cream-white leaf-margin; growth dwarf, compact, and effective.

*Lass o' Gowrie*.—A great improvement upon "Italia Unita," being more dwarf and compact in habit of growth; with deep green disc or leaf-centre, bright carmine rose-coloured zone, clear white leaf-margin, and rosy scarlet flowers.

*Princess Beatrice*.—Flat salver-shaped foliage, deeply indented edges; margin pure white, surrounding a scarlet zone; centre bright smooth green.

*Excellent*.—A very good habited variety, with highly-coloured carmine zone, shaded dark, bright green centre and white margins; was awarded first prize as the best Silver Variegated Zonal at the Special Pelargonium Show, at South Kensington, on May 22, 1869.

#### SILVER-MARGINED.

*Silver Chain*.—Pure white margin, rosy pink flowers; one of the best silver-margined varieties, being of compact and dwarf habit, ample foliage; well adapted for ribbon-lines, &c.

*White Lady*.—Broad, pure white margin, with rich green centre. Its numerous trusses of elegant blush-white flowers and compactly-branched habit form a very distinct feature; it is also well adapted for winter decoration.

*Castlemilk*.—With pure white margin; an excellent bedder.

*Snowdrop*.—Broad white-margined leaves; a free and very effective variety.

*Lady Fair*.—Creamy-white margin, with centre of bright green; good trusses of white flowers, with rich salmon centre; growth free and compact.

*Stella Variegata*.—A nosegay variety between "Mrs. Vernon" and "Mangles Variegated;" centre of leaf green, with light-yellow margin changing to white; light flame-coloured zone, disappearing as the leaf becomes fully developed; scarlet flowers, very free bloomer; excellent for pot-culture, or for small beds or marginal lines.

*Charming Contrast*.—A very effective variety, with broad pure white leaf-margin; habit dwarf, and densely compact; flowers deep rose or pink.

*Queen of May*.—A fine handsome silver-edged nosegay variety, with pointed lobed green centre, and broad white leaf-margin; truss large, and colour of flower bright lake crimson.

*Imogene*.—Broad and effective silver leaf-margin; growth vigorous and compact.

*Magenta Queen*.—Neat densely-branched habit, with broad green leaf-disc or centre; slightly lobed and outwardly margined with a clear silver line; good flower-truss, with bright lake-carmine blossoms, which forms a fine contrast with the foliage.

*Waltham Bride*.—A fine compact close-habited variety, the flowers rising just above the foliage in good-sized trusses, produced in great abundance, and

in colour pure white; centre of leaf dark green, with broad white margin.

*Bright Star*.—A short-jointed robust variety, with broad edge of creamy white; took first prize in its class at the Special Pelargonium Show held at Kensington on May 22, 1869.

#### BRONZE ZONALS.

*Beauty of Calderdale*.—Fine handsome leaf, bold outline, and very distinct and regular in shape, with a bright reddish-bronze zone on a greenish-yellow ground.

*Countess of Kellie*.—Leaves bright golden yellow, with light-chestnut zone, shaded with bright red; habit vigorous and compact; a fine and effective bedder.

*Duke of Edinburgh*.—Light golden-yellow leaf-ground, impressed with a broad bright bronze-red zone; habit dwarf, vigorous, and compact; a very effective variety.

*Edward George Henderson*.—A fine variety, with a large crimson and maroon zone; habit compact and free.

*Her Majesty*.—Leaf medium size, round and flat, with small yellowish-green disc, and very broad bold zone of a red cinnamon colour; habit compact, vigorous style of growth, and flowers of rosy scarlet; one of the most effective varieties.

*Kentish Hero*.—Leaves large, of a light greenish-yellow colour, with a broad zone of dark bronze; vigorous grower; a very distinct and striking variety.

*Perilla*.—Leaves very attractive, showing a deep, broad, and well-defined zone, on a yellow and green ground ; a very free grower.

*Miss Beatrice*.—A very beautiful variety, of dwarf vigorous growth, and well-branched habit ; leaves nearly circular in outline, of requisite substance and size ; evenly expanded, and the rich bronze zone well defined, forming a fine contrast with its remarkably bright broad golden leaf-margin.

*Red Ring*.—Vivid reddish-chestnut zone on a bright golden leaf-ground ; leaves flat, and of vigorous habit.

*Princess of Wales*.—Rich yellow ground-tint, impressed with a conspicuously bright bronze-red vandyked zone ; habit dwarf and compact ; one of the most beautiful of its section, and a most effective bedding plant.

*Harrison Weir*.—Leaf-ground canary yellow, with a narrow zone of bright chestnut colour near the centre of leaf ; very broad margin of ground colour ; leaves circular and slightly curved ; one of the best and most distinct varieties.

*Stanstead Beauty*.—Pale yellowish-green leaves, with medium dark bronzy zone ; leaves large, striking, and of good shape ; good habit, and very vigorous grower.

*Crown Prince*.—A very handsome variety, with a high-coloured chestnut zone.

*Beauty of the Parks*.—Great improvement upon “Beauty of Oulton ;” robust branching habit ; well-defined dark zone ; flowers orange scarlet ; fine large truss.



*Dazzling Contrast*.—Rich deep zone on a light gold leaf-ground ; flowers brilliant orange scarlet ; truss large ; habit vigorous and compact ; a very effective bedder.

*St. John's Wood Star*.—Brilliant red zone upon a yellow leaf-ground, with a pure outer gold margin ; a very beautiful and effective variety.

*Beauty of Riverdale*.—A highly-ornamental variety, of vigorous and well-branched habit ; large velvety-surfaced leaves of good substance, well expanded, and well proportioned in outline. The well-defined flame-tinted bronze zone is in beautiful contrast with the margin ; well adapted for either pot-culture or as a bedding plant.

*Feu de Joie*.—Large leaves, slightly convex, clear golden yellow, with broad zone of cherry red ; habit free and compact ; flowers rose carmine ; a very distinct variety.

*Arab*.—Ground colour rich yellow, with broad zone of rich dark brown, almost black ; foliage large, flat, and circular, of good substance ; habit of plant free, compact, and branching ; suitable for bedding out or for exhibition.

*Criterion*.—Rich golden-yellow ground, with broad even belt of rich chestnut red, with neat golden margin ; foliage very large and very flat ; a very fine variety.

*Sibyl*.—A very distinct and striking variety, of dwarf and compact habit ; foliage medium size ; colour deep chestnut brown, with small circular centre, and very narrow even margin of yellow ; flowers rich

scarlet. This will possibly prove one of the finest bedding varieties.

*Plutus*.—Rich golden yellow, with rich chestnut zone of medium depth, and well defined.

*Bronze Queen*.—Golden-yellow leaf-ground, with a deep, rich, well-marked dark bronze and crimson zone; a magnificent variety, and worthy of its name.

*Hon. Mrs. Claughton*.—Ground colour rich golden yellow, with a narrow well-defined bronzy chestnut zone, following the indentations of the leaf, which is deeply cut; a very distinct variety.

*Mrs. Alan Lowndes*.—Yellow leaf-ground, with broad chestnut zone; fine foliage and habit; a fine variety.

*Black Prince*.—Ground colour bright yellow, with fine broad red zone; free habit; large foliage; profuse bloomer; and altogether a magnificent variety.

*Prima Donna*.—Leaf-margin and disc yellow, with extra broad zone, of a dark bronzy-red colour; compact and vigorous in its habit of growth.

*Cleopatra*.—Deep maroon zone, on light straw-coloured ground, with golden margins; a very free bloomer; flowers bright rose colour, well thrown up above the foliage.

*Southern Belle*.—A most distinct and splendid variety, with very deep chocolate zone.

*W. R. Morris*.—Leaves large, smooth, and flat, bright golden-yellow ground colour, with well-defined zone of very brilliant dark chestnut, covering nearly one-half the leaf; of vigorous growth and

fine compact habit ; a most beautiful and telling variety ; and took first prize in its class at the Special Show held at South Kensington on May 22, 1869.

*Imperatrice Eugenie*.—Leaves very large, irregular surface, and ground colour light sulphury yellow, with very broad zone of dark bronzy chocolate, covering nearly two-thirds of the surface of the leaf ; a very fine and distinct variety.

*Brilliancy*.—An exceedingly beautiful and distinct variety, well worthy of its name, the ground colour being bright pale yellow, or straw colour, with a very broad zone of rich clouded crimson.

*Sofrano*.—A very neat-growing variety, with circular lobed leaves and very effective chocolate red zone on yellow leaf-ground, and proportionate outer margin.

#### YELLOW OR GOLDEN SELFS.

*Little Golden Christine*.—Habit very dwarf and compact ; neat yellow foliage ; flowers pink, and produced in great abundance.

*Little Golden Spread Eagle*.—Habit dwarf and compact ; foliage bright yellow, producing great abundance of bright orange-scarlet flowers.

*Star of Gold*.—Rich self gold tint, very dwarf and compact ; leaf of fine form and substance ; well adapted for outer belt or ribbon-line.

*Yellow Gem*.—Foliage of a soft pure shade of yellow ; habit dwarf, compact, and freely branching ; flower bright deep rose, produced in large trusses well above the foliage.

*Yellow Christine*.—An exact counterpart of the well-known variety Christine, in flowers, habit of growth, &c., but the foliage is of clear bright yellow colour.

*Golden Queen*.—Leaves rich greenish yellow, changing to golden yellow, with a blotch of light yellow in the centre of each leaf; flowers brilliant scarlet.

*Golden Beauty*.—Leaves round, of good form and even outline; colour pure golden yellow; very bright and attractive variety.

*Jason*.—Very deep and rich pure golden-yellow foliage.

*Golden Nugget*.—Leaves pale yellow; a good bedding variety.

## APPENDIX.

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THE following are copies of a few of the many letters which have from time to time appeared in the various horticultural periodicals relative to these plants. They may possibly be found to be interesting, tending, as they do, to show the interest that has been taken in their production and cultivation, and showing also the opinions held by the various writers upon the subject.

### I.—SPORTS OR SEEDLINGS?

The subject of Variegation in Flowers, as produced by seeds or sports, is one of great interest to physiologists as well as florists, and I am glad to see it discussed in the leading journals on gardening. Mr. Grieve does not mention whether "Mrs. Pollock" was raised from known parents, or whether it was a chance seedling. It would be satisfactory to know this. "Mrs. Pollock," whether used as the seed-bearing or as the pollen parent, seems to produce a large percentage of the curious bronzy yellow selfs now cultivated. "Golden Fleece," or a similar form, was raised by Mr. John Goode, a very intelligent young gardener, at the Bishop of Winchester's, soon after he left my garden, where he probably, with the

rest of my men, became infected with the fascination of getting a cross.

"Golden Chain" is said to be a very old variety, and a sport from the wild *inquinans*. A gold-margined sort was known to Miller. This is said still to exist in the form of a narrower-margined sort cultivated in our gardens before it was eclipsed by "Golden Chain." I have always sought the green sport from "Golden Chain," in hopes of procuring the true *inquinans* for comparison, but have not yet happened to meet with it. Seedlings from "Golden Chain" all came green when used as the seed parent, and not artificially fertilized. In spite of the circumstance mentioned by Mr. Grieve, I am inclined to think that many *Geranium* [*Pelargonium*] blossoms are fertilized with their own pollen. Experiments are much wanted to show the effect of raising seedlings from florists' flowers and cultivated vegetables, in a state of isolation from the influence of strange pollen, and especially when continued for several generations. One of my men raised an extremely interesting seedling from "Christine" by "Golden Chain." Some of the shoots were gold-variegated, the rest of the plant had the pale-green blotch on a darker ground, as in "Queen of Summer," but the blossoms retained the colour of "Christine." I have the plant still, as it is handsome in its way, and has some good properties. I lost the plants derived from the gilded portion, and they were not of sufficient floristical value to be retained at Chiswick. "Flower of the Day" is said to have originated at Messrs. Lee's establishment. It produced many variegated seedlings with me. "Stella" gave me a pale, golden-variegated sport last year, passing into white as the leaf matured. It was slow in growth, but has improved this year; I know not how it has behaved at Chiswick. Mr. Grieve's classification of Variegated *Geraniums* is excellent, and should be adopted.

I cannot conclude without remarking that the modern physiological botanists by no means discourage the labours of the hybridists, but look upon them, if accurately conducted and accurately reported, as a valuable help to the determination of species. It would be well if hybrid and cross-bred plants, of authentic parentage, accompanied by their parents on both sides, were to appear, and were encouraged to appear, at our now really scientific Tuesday meetings at South Kensington.—“*R. T. C.*” in the *Gardeners’ Chronicle*.

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Will Mr. Grieve kindly inform me if “Mrs. Pollock,” when a seedling, was green in the first instance, and afterwards became variegated? I ask this question because I have been under the impression that all variegated Pelargoniums are sports from green plants; and lately, while visiting Mr. Wills at Huntroyde, my attention was called to a greenish sport from “Mrs. Pollock,” which I have no doubt was a true form of the well-known “Cerise Unique,” a fact which would indicate that plant to be the parent of “Mrs. Pollock,” whether in the shape of a sport or from seed. I have always found white or much variegated seedlings from variegated plants to die off as soon as the seed-leaves were formed, and much more rapidly in strong light than in shade; the same thing occurs with seedlings of variegated Hollies, Ivies, &c.

Lately, while visiting the nurseries of the Messrs. Backhouse and the Messrs E. G. Henderson, I was shown a quantity of seedling Pelargoniums from “Mrs. Pollock” and others of that strain. Among these, in many cases, I observed several distinct varieties on one plant, and, as far as I could see, on plants having a green origin. A batch of seedlings with me this season from “Mrs. Pollock” has fur-



nished about one-half variegated, all of which are dead ; the remainder have green leaves, and are growing freely. An inspection of Mr. Wills's extensive and beautiful collection certainly confirmed my previous experience with regard to variegated Pelargoniums. One of Mr. Wills's most beautiful varieties this season has been obtained from a plant which was wholly green last year. And any one not in the secret would be at a loss to understand and appreciate his long lines of sturdy luxuriant plants, which look more like cabbages than ordinary Pelargoniums. Yet it is from these Mr. Wills expects to add to the fine things he has already produced. On closely inspecting these young "Tree Mallow" looking plants, I noticed quite at the base of the stem in many cases a group of beautifully-variegated young leaves, and in close proximity to them several headless trunks were showing only the beautiful leaves at their bases.—*J. Tyerman, Botanic Gardens, Liverpool, in the Gardeners' Chronicle.*

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The discussion on the Sport or Seedling question, which was opened in our columns some time since, has served, we are glad to remark, to elicit a good deal of valuable information, to suggest new fields for inquiry, and to afford abundant opportunity for speculation. One very interesting point has been mooted in the course of these inquiries—viz., the degree of influence which can be attributed to man's artificial operations in the production of these variations.

Of course it would be rank heresy to tell a man, after all the pains that he has taken, that the effects he sees are not directly attributable to his efforts ; and yet some do go as far as that. Far be it from us to assert so much. What a chorus of indignant remonstrances should we bring down upon our unlucky selves, did we uphold a doctrine so utterly distasteful to the complacency of the successful cultivator ; and, in-

deed, in the face of the facts recorded in our own columns and elsewhere, no one would think of denying that the skill of the cross-breeder has been productive of marvellous results, which would not have come to light but for his experiments. Take, for illustration, the origin of Pelargonium "Flower of the Day," as stated by Mr. Kinghorn, or especially that of the favourite "Mrs. Pollock," whom, by the way, our Continental friends will persist in calling "' *Mistriss*' Pollock." In this last case Mr. Grieve sat himself down, with definite purpose, to produce Tricolored Pelargoniums; and he succeeded. He has given the pedigree in our own columns, while in the *Journal of Horticulture* he gives the train of reasoning which suggested and guided his experiments. We take such facts as these to be irrefragable; but, on the other hand, we are loath to believe that all, or even a majority, of the varieties that are now met with, are the designed products of cross fertilization; the niceties of the operation—the knowledge required of a plant's peculiar habits and constitution—and, on the other hand, the rough-and-ready manipulations often practised in such instances, forbid us from acknowledging in all cases the parentage assigned to the varieties. Before we could do so, we should have to be satisfied that all the requisite conditions had been fulfilled, the proper time selected, the necessary manipulations executed with sufficient care, and all sources of fallacy scrupulously guarded against. Who that reads of the precautions deemed necessary by the greatest practitioners of the art—the Gärtners, the Kolreuters, the Nau-dins, the Darwins, the Henrys—and compares them with the careless methods too often adopted, but will mistrust the results obtained, or said to be obtained, by the less careful class of operators; and this, of course, without in any way impugning their veracity or their good faith.—*From Leading Article in the Gardeners' Chronicle.*

## II.—ORIGIN OF "MRS. POLLOCK" PELARGONIUM.

I have much pleasure in complying with the request of Mr. J. Tyerman. The Pelargonium "Mrs. Pollock" was not green in the first instance, but came variegated from the cotyledons, and has always remained so. I may further state that such has been the case with regard to all the best of the variegated Pelargoniums that I have raised, including "Mrs. Benyon," "Lady Cullum," "Sunset," "Lucy Grieve," &c. But I have also secured many variegated varieties in the manner described by Mr. Tyerman as being practised by Mr. Wills; and to reconcile this statement with my former assertion, that I had never raised a variegated Pelargonium from a sport, I may as well explain that I do not consider any form obtained from a seedling under one year old as a sport. I consider the term "sport" to apply only to deviations in form, colour, or habit, either in foliage or flower, from the well-known and recognized habit or form, &c., of established varieties. Very possibly difference of opinion may exist as to the acceptation of this term, and it is certainly desirable that uniformity as to its exact signification should be established. Mr. Tyerman is not quite correct in supposing that the well-known variety "Cerise Unique" was one of the immediate parents of "Mrs. Pollock," although if the latter-named variety was endowed with the power of speech, and if also inspired with something like pride of birth, she might with justice claim descent from that well-known and celebrated variety; but I am rather inclined to think that the beautiful "Mrs. Pollock" would prefer to stand or fall by her own merits, and would be more likely to say, in the words of the Poet-Laureate, that "she was too proud to care from whence she came." However, for the information of Mr. Tyerman, and also of "R. T. C." (who

I am very pleased to see approves of my proposed classification of Variegated Pelargoniums), I will give as briefly as possible, and so far as I know, the pedigree of "Mrs. Pollock." The seed-bearing parent was a variety called "Emperor of the French," and the pollen parent was "Gold Pheasant." The seed parent of "Gold Pheasant" was also "Emperor of the French," and the pollen parent "Golden Tom Thumb." The seed parent of "Golden Tom Thumb" was "Cottage Maid," and the pollen parent "Golden Chain." The seed parent of the "Emperor of the French" was "Cerise Unique," and the pollen parent a silver variegated variety named "Attraction" (introduced by the Messrs. Lee). The result of this latter cross was the production of three distinct varieties on one plant—viz., "Emperor of the French," "Empress of the French," and "Rainbow." The first of these is a strong grower and a good bedder, and was much in favour in this locality until superseded by Mr. Beaton's famous "Stella;" the "Empress" is of dwarfer habit than the "Emperor," having the stems and leaf-stalk striped, as in "Cerise Unique;" and "Rainbow" is a silver tricolor of considerable merit. Which of these three varieties should have been considered as sports, and which as seedlings? It has been stated that somewhere in the north of England "Mrs. Pollock" has produced a silver variegated sport, but this requires confirmation. If correct, it is a very interesting fact, and well worthy the consideration of physiological botanists, as it would appear to show a tendency to revert to the peculiarities of a rather remote ancestor.—*P. Grieve, Culford, in the Gardeners' Chronicle.*

## III.—ON VARIEGATED ZONAL PELARGONIUMS.

I have been much amused in reading and hearing the remarks of those who can account so well for the wonderful change of colour we have seen in Zonal Pelargoniums. One man can produce at will just what he likes ; nothing is easier. Another knows all about it, only some stray pollen interferes, or there is too little electricity in the atmosphere. According to another, the Pelargonium has been grown under certain abnormal conditions so long, that a disposition to sport into bright colours has manifested itself in this tribe of plants everywhere at the same time. One very clever man says it is owing to their being grown in a soil highly charged with iron ; and I have heard much about the scientific production of seedling Tricolor Pelargoniums.

It is rather remarkable that we have not a single plant of this class which has not been raised since Mr. Grieve sent out "Mrs. Pollock," and I do not believe there is one worth having which has not descended from his varieties. I do not know Mr. Grieve, but I have been struck with the fact, that whilst he has done so much he has said and written so little. If he had ever pretended that he foresaw the probability of our dark-zoned Pelargoniums becoming tricolors before he saw any indications of such a change, and that he had crossed for the express purpose of producing them, I, for one, should have thought him a great humbug. That he carefully bred from those which had changed we all know. When at Dulwich last year, I saw some very promising varieties ; several, I thought, very valuable. I asked Mr. Smith how they had been produced, and he said, "I have tried every cross I could think of, and have saved the

best." I thought, "Well, that is better than pretending to be so very wise." Perhaps some one will say, "Why, you are like Bernardin de St. Pierre, writing not to tell what you know, but to prove that no one knows anything." Well, that is about the state of the case.

I believe that, from some cause unknown, the dark colouring matter has turned red, and that a tendency to such change is transmissible to the seedlings of plants so affected; and I believe this is all we do know. In proof of my opinion, I will state my own experience. My first attempt was to cross "Mrs. Pollock" with "Woodwardianum," saving the seed from the former. The produce were all dark zonal Pelargoniums, one of which I named "William Underwood;" it resembled "Clipper" and "Dr. Lindley," but was superior to both, and is still the finest named scarlet variety I have seen. Not one of this first lot showed the slightest sign of variegation. The next season I tried various crosses, and raised about three thousand seedlings, some of which were very beautiful; but as I kept no record of what they were raised from, I had no idea what had led to success. Last year I named all the seed gathered, believing that the darker the zone the brighter the colours might be expected to prove if changed. I selected the darkest zones I could find amongst my seedlings, some of which were almost black, and crossed them with the best of the tricolors, saving seed from both—that is, the green with black zones, as well as the tricolors. I also used "Mrs. Longfield," "United Italy," "Flower of Spring," and others in the same manner. When the seed vegetated, I marked all those seedlings which came up coloured, also those which had green cotyledons; and now for the result. Of those plants which came up with white or nearly white cotyledons, all died; those with yellowish-green or striped cotyledons are nearly all variegated or coloured, but many of them



sickly and delicate, whilst some are very promising. Some of those which came up quite green are now showing signs of breaking into tricolors, and many, after growing to be a foot high, break from near the ground into tricolor markings—that is, put out a side shoot which is tricolored. There are seedlings from “Mrs. Longfield” resembling their parent, whilst others are amongst the darkest green with the blackest zones of any in the house. “Flower of Spring,” a white-edged kind, has produced a seedling almost identical with “Beauty of Oulton” or “Mrs. Longfield,” and others green with dark zones. Tricolors have produced both tricolored and green seedlings, and green varieties with dark-coloured zones have produced both tricolored and green seedlings.

If any one can deduce science from such an experience it is more than I am able to do. The only deduction which occurs is, try all the crosses which appear likely to produce a good result, and then follow the example of a first-rate breeder of greyhounds, who, when asked how he managed to have so fine a set of dogs, said, “I breed a great many, and I hang a great many.” To talk of science in connection with such a subject is mere pretension.—*J. R. Pearson, Chilwell, in the Journal of Horticulture.*

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#### IV.—ORIGIN OF VARIEGATED ZONAL PELARGONIUMS.

I have read the letter of your correspondent Mr. Pearson with some interest, as having, like him, been considerably amused by the contents of some of the letters which have from time to time appeared on this subject. I also hope,



and I am inclined to think, that on a second thought Mr. Pearson will hardly feel inclined to set me down as a humbug, if, as far as Golden Tricolor Pelargoniums are concerned, I plead guilty to the charge of "having foreseen the probability of our dark-zoned varieties becoming Tricolors, and crossed for the express purpose of producing them;" and, what is more, I certainly made no secret of my views on the subject; and should you be kind enough to give this letter a place in your columns, it will in all probability meet the eye of more than one who may recollect having heard me express those opinions previous to the introduction of "Mrs. Pollock," or any other Golden Tricolor Pelargonium.

What suggested the idea to me was simply as follows:—I had observed that by crossing the silver-margined varieties, which were not numerous at that time, with the green-leaved zoned sorts, the result was a percentage of seedlings with silver margins, and some of them with the addition of a well-defined red or pink zone, very pretty when the foliage was in a young state, but nearly disappearing as the leaves advanced in age.

Reasoning from analogy, nothing I think could be more natural than to arrive at this conclusion—viz., that as the union of a zoned with a silver-margined variety was ascertained to produce progeny having pink or red zones, and also silver margins, so the union of a zoned variety with a yellow-margined variety might reasonably be expected to produce progeny having yellow margins, and with zones of more intensity of colour. Supposing, as I did, that the mingling of brown and yellow might produce a red, on the same principle as blue and yellow will produce green, the anticipations of those results led to various experiments being tried, and their realizations are now sufficiently well known; and I believe that it is generally admitted that the

introduction of this class of Pelargoniums is a consummation worthy of being wished for.

Some of my friends, I believe, give me credit for being instrumental in their production; others qualify the matter by saying that I did so "quite accidentally;" and others say that I had nothing whatever to do with it, but that they produced themselves spontaneously, and simultaneously. —*P. Grieve, Culford, in the Journal of Horticulture.*

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#### V.—PRODUCTION OF VARIEGATED ZONAL PELARGONIUMS.

In addition to the beauty of the foliage of Variegated Pelargoniums, there is an interest in their production as an aid to a solution of the mysteries of hybridization and variegation, and however opposite the deductions of operators, a record of their experience will always have a high value.

Your latest correspondent on this subject is Mr. Pearson, and he adds to his useful remarks an apparent objection to the connection of scientific inquiry with the practice of cross-fertilization for new forms and colours; that such an objection cannot be really intended must be obvious, for Mr. Pearson had just advanced good reasons for his selection of plants for fertilization. In the same way, the Mr. Smith of Dulwich, that he names, does not deal haphazard with pollen and pistils. I know well Mr. Smith's careful combinations, his unwearied care, and the beauty of the result. It is an acknowledged truism that the more we know, the better will be our practice. Investigation conducted in a scientific spirit cannot fail to give new truths that will admit of wider application than mere Pelargonium culture.

With reference to the Zonal Pelargonium leaf, Mr. Pearson remarks "that, from some unknown cause, the dark colouring matter has turned red, and that this tendency

becomes hereditary." Let us endeavour to make a step towards this "unknown" cause ; it may be but a very short one, but it will be an advance.

Yellow, red, and blue, and their combinations in their infinite variety, give us the whole range of our experience of colour ; and a leaf of the Zonal Pelargonium in its so-called green state contains within itself the three primary colours—yellow, red, and blue. For example, sketch the outline of the leaf, mark thereon the zone in red ; then, with a transparent colour, cover the whole within the outline with yellow ; the result is a yellow leaf with an orange zone. Again, cover the whole with blue, and if the proportionate depths of tint have been duly observed, the appearance of a green leaf will be produced with a zone of dark, ill-defined colour. The beauty of the Tricolor, whether white or golden, depends upon a disturbance of the proportion of the three primary colours. A partial removal of the blue gives the golden ground and the brilliant orange or red zone, and the partial absence of the three colours leaves a white ground. The specimens upon which changes are required should be treated for combinations as the pigments in the artist's colour-box, and but for the many yet imperfectly investigated causes, the certainty of tint in the cultivator's hands would be equal to the artist's ; but with both much will have to be studied before a desired result can be produced—the influence of sex, the unknown tendencies to hereditary reappearances and divergences, the singular production of new colours by sporting, as it is vaguely termed, instead of direct from the seedling stock, together with atmospheric and actinic influences, all tend to veil this subject with the mystery attendant upon uninvestigated causes ; still a glimpse of light can be obtained, and by its guidance the production of a Tricolor or Variegated Pelargonium is not the mere chance work it is usual to consider it.

With a better knowledge of animal physiology, the greyhound breeder alluded to by Mr. Pearson would obtain better results with fewer puppies and less hanging. When vegetable physiology becomes better elucidated, in like manner the gardener will have less necessity for large seedlings, and fewer contributions to the rubbish-heap. My own experience has been, that, with some attention to the laws of colour, I have with a very few seed-pans been able to follow very closely upon the largest Pelargonium growers.

Mr. Pearson observes that no single plant of this class was antecedent to "Mrs. Pollock." I am sure he will pardon a correction of this statement. The first "Golden Tricolor" I saw was raised some fifteen or twenty years ago by Mr. Basket of Blackheath, and was appropriately named "Rainbow." I cultivate it still, and largely, for its splendid truss, in the borders. In early spring, the crimson zone on its yellow ground has not yet been surpassed. As summer advances the green predominates. From "Rainbow" a sport was shortly after produced with a silver ground, a forerunner of "Italia Unità;" this plant still holds its place in the catalogues as "Burning Bush." From these plants, long previous to "Mrs. Pollock," seedlings of merit have been raised at Mr. Hally's Nursery, Blackheath. This "Rainbow" must not be confounded with a second and later plant of the same name, and altogether distinct from it.

I notice this as pure matter of fact, and without the slightest intention to detract from Mr. Grieve's claim, should he make it, to a different origin for his splendid seedlings. For the pleasure they have given me I am under a deep obligation; and I wish, for the light he could throw on this subject, that we knew more of the history of his unrivalled plants.—"*M.*," *Deptford, in the Journal of Horticulture.*

VI.—ON THE ORIGIN OF COLOUR IN VARIEGATED  
ZONAL PELARGONIUMS.

I have read with great interest the very able remarks of your correspondent "M.," and perhaps you will kindly allow me to thank him for his very courteous criticism of my letter on the same subject.

Science, I am now aware, did not justify me in supposing that brown and yellow would produce red ; but, paradoxical as it may appear to be, ignorance in this particular instance proved an advantage, as acting on this erroneous conviction, and aided by some principle inherent in the leaf, but of the nature and properties of which we are at present ignorant, the desired effect has been produced.

With regard to the Golden Tricolor Pelargonium mentioned by "M." as having been raised by Mr. Hally of Blackheath, some fifteen or twenty years ago, and named "Rainbow," I can only say that I never saw it and never heard of it before ; and it certainly seems strange that this variety should have remained in obscurity so long. Pelargonium "Mrs. Pollock" was raised, I think, in the year 1858, and when it was sent out two or three years later, some one in writing upon the subject subsequently said "that the advent of 'Mrs. Pollock' literally took the horticultural world as it were by storm." That it created a sensation is not to be denied ; and it is really difficult to believe that a variety quite equal to it, according to "M.," should have been flourishing for so many years before that time at Deptford or Blackheath, and yet so very few people have known of its existence. I most sincerely trust, however, that "M." will set the matter at rest by exhibiting a plant of this variety at the Exhibition of Tricolor Pelargoniums to be held at Kensington.

I cannot at present refer to Mr. Pearson's letter, but I think that he did not exactly say what "M." says he did—viz., "that no single plant of this class of Pelargoniums was antecedent to 'Mrs. Pollock.'" I think he said "that none worth growing existed previous to the introduction of this variety."

"M." is decidedly in error with regard to the origin of "Italia Unità." That variety was produced between a dark-zoned seedling of my own, and a Silver Tricolor sort named "Rainbow," also raised by myself. "Rainbow" was produced between "Cerise Unique" and "Attraction," and both the last-named varieties were, I believe, raised by Mr. Kinghorn; and the last named ("Attraction") was, I believe, the first Silver Tricolor Pelargonium produced. I have never once used "Burning Bush" for the purpose of breeding. I am inclined to think that there exist physiological reasons for doubting the fact of a golden-margined variety producing a silver-margined sport; but possibly I may be wrong in this supposition, and at all events the fact requires confirmation.—*P. Grieve, in the Journal of Horticulture.*

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#### VII.—ON VARIEGATED PELARGONIUMS.

The Royal Horticultural Society has proved alike its wisdom and the reality of its desire to serve the highest interests of horticulture, by resolving to hold a special Exhibition of Tricolor Zonal Pelargoniums on May 21 [1867]. One of the most useful purposes of such an exhibition will be to establish real merit, and stamp out of the trade at least, if not out of existence—for it is a pity that anything of beauty should perish—all that are decidedly

inferior. While due importance will doubtless be given to colour, I hope other considerations will not be lost sight of. There are some pretty things that have been in existence for years, and never will be worth one farthing for decorative purposes. They are pretty toys, and nothing more. No one can make them grow. Constitution is one of the first merits in any beautiful plant, but especially among these, which require to be produced by the million; habit is another point of great importance. If these two are faultless, and the colour striking and distinct, or brighter than existing varieties, then only will a new variety have sufficient merit to command public support.

Only of secondary import to this unique exhibition itself are the questions that are to be asked of cultivators respecting the origin of their varieties, and the probable causes of their production. Each plant is to compete for honours with its history and origin attached; and if these are certainly known and truly given, a most valuable mass of information upon the influence of progenitors, paternal and maternal, and the transmission of parental idiosyncrasies or distinctive peculiarities, will be brought together. The expression of opinion on the causes of variegation by those who may be presumed to have studied them in pursuit of their efforts to change the colour of leaves or flowers will also have a special interest and value.

The plants without pedigrees will, in one sense, be almost as instructive as those that have them, for they will furnish data on the vexed question of how many are the results of direct design on the part of hybridists, how many may have originated in their haphazard chance-work operations, and in what proportion they are the products of nature's operation uninfluenced by the interference of man. It will only be fair that nature should have the credit of producing at least half of the pedigreeless plants; for doubtless, if any



good thing is raised, and its raiser knows anything at all about it, he will not be backward to cover the plant with a pedigree that reflects some of the beauty and glory back on himself. I am enabled, however, to state, as a matter of fact, that many, perhaps most, of the best plants that will appear at Kensington will be accompanied with a truthful pedigree. Their history is known to myself and others as well as to their raisers, and can be traced back through six or seven generations. Such a record, written indelibly upon their leaves as well as on their pedigree-cards, and thus twice displayed, can hardly fail to throw fresh light, if not upon the origin of variegation, at least upon the almost equally interesting, if not even more practically important problem of the likeliest modes of producing it, and of perpetuating and intensifying it after its manifestation.

Practical men can at least speak with authority on this branch of the subject. If their practice has been less carefully minute than that of scientific manipulators, it has at least been equally or more successful. By their fruits we are content to assess their skill, and I challenge even the great Darwin to place the species or varieties that he has originated beside those of Mr. Grieve on the 21st of May, and allow the public to judge for themselves. Neither am I careful to uphold all the theories of the hybridists. A serious slip in the theory or nature of colour may readily be forgiven when the results of their theories, right or wrong, have produced such splendid results. What I contend for is, that most of the best practical hybridizers have a theory, and that their success has either resulted from or been coincident with its persistent application. Take, for instance, Mr. Grieve's practice, as that with which I am best acquainted, and that has resulted in at least a great amount of success. His theory was, and is, that by mixing silver and dark zonate blood, the silver would probably be im-

proved, and a new pink colour obtained. Finding that this was actually the case, he poured golden blood into zonals, with the express purpose of developing red, while improving the gold, and his splendid Golden Tricolors came forth at his bidding. It matters little whether Mr. Grieve has or has not given in the *Journal of Horticulture* the true *rationale* of the working of his own theory. The point of most import is, that his theory led to the intermarriage of such varieties, and has given to the world such splendid strains of colour, form, and stamina as characterize his best seedlings.—*D. T. Fish, Hardwicke House, Bury St. Edmunds, in the Gardeners' Chronicle.*

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#### VIII.—ON VARIEGATED ZONAL PELARGONIUMS.

I have perused with great interest the various remarks recently made upon the Pelargonium, and have much pleasure in contributing the results of my experience of the last twelve years. Within this period I have raised many thousands of these plants from seed annually, and have not observed in a single instance a plant of the zonal, or the plain green-leaved type, to sport into variegation, unless fertilized with the pollen from a variegated sort; nor have I known variegation to be produced unless it has been perceptible in the seed-leaves. For instance, seeds saved from "Madame Vaucher," the flowers being crossed with pollen from "Mrs. Pollock," would probably produce tricolor-leaved plants at the rate of ten to twenty per cent. only. I feel thoroughly convinced that, unless variegation is discernible in the cotyledons, the plant will always remain green, and not sport. Respecting the sports from "Stella," doubtless the seed-leaves on the parent plant were slightly marked,

which might have been occasioned by accidental hybridization. I have frequently observed plants, which in their first stages were variegated, to become rapidly quite green, and then suddenly to receive a check, caused by a sport making its appearance. In this case both varieties have been propagated; the green-foliaged form has grown vigorously, and has produced a sport similar to that from the parent plant. Referring to Mr. Chater's remarks, I quite agree that it would be a great acquisition could we introduce copper or metallic leaved varieties, as substitutes for Perilla. This I have been aiming at, and have succeeded in raising several in that way. I enclose some leaves for your inspection. I wish Mr. C. every success in his endeavours to obtain a Pelargonium with yellow flowers; but I fear such a result will not be easily accomplished. For my part, I am aspiring to obtain blue flowers, a result not more improbable, and the effect would certainly be more attractive on some of our choice tricolors. I have flowers more nearly approaching to violet or blue than I have seen any tending towards yellow. As regards the classification of Pelargoniums, Mr. Grieve's suggestion appears to be excellent; its adoption would prevent much confusion, especially in the case of plants exhibited for competition. What class would the enclosed leaves, being red and black in the centre, with narrow yellow margin, represent?—*William Groom, Ipswich, in the Gardeners' Chronicle.*

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#### IX.—THEORY OF VARIEGATION.

The red colouring in the foliage of "Mrs. Pollock," "Lucy Grieve," and the pink in "Italia Unità," are a beautiful illustration of the simple defined law of nature governing colours. Some Pelargoniums are affected by a constitu-

tional weakness or decline, which is the cause of all variegation, into two colours—yellow and white grounds—varying in different shades of clearness and intensity. The zone, or band, on the old Horse-shoe Geranium, which has been intensified of late in the numerous varieties of zonals, is naturally of lake or pink colouring matter. The primitive colours are yellow, red, and blue. A mixture of yellow and blue makes green, and is so far fixed, and is not transfusible again, having lost the natural power of transfusion, when combined, that either possessed in a separate state ; so that when the yellow-ground varieties are crossed with dark-banded zones, this colour being pink, falling on the yellow ground, naturally transfuses to red—pink and yellow making red ; but when the green or mixed colour lies under, it has no power of transfusion, not being a primitive. When the zone falls on a white ground, it naturally brings out pink. White, properly speaking, being no colour, shows exactly the colouring matter of the zone. These facts being established, the hybridizer has an easy task before him, as the effect produced all depends on the ground colour and the zone, which ought to be heavy, and well run out to the white or yellow ground of the leaf. Variegation, being a disease or weakness, is more developed at the extremities than towards the centre of the leaf, which is observable in all blotched variegations in other plants that are not of a permanent character, the healthy circulation surrounding the disease sooner or later absorbing the variegation by a healthy action.

The primitive laws of colour were much better understood and studied by the ancients than by the artist of the present day ; hence all the paintings of the old masters—Rubens, Claude, &c.—were worked entirely on these three primitive colours, making their own colours from the mountain strata—the red from the oxide of iron, their yellows

from the mineral ochre, and their blues from *lapis lazuli* or filtering of oxide of copper. This fully accounts for the difficulty in the present and past ages of imitation ; for Rubens had his own mixtures for his reds which Claude had no means of knowing, nor could Rubens tell what mixture Claude employed to bring out his brilliancy.

The striking beauty now displayed in the leaves of the Tricolored Pelargoniums will tend to explain, in a great measure, the same natural law of colours in other fine-foliaged plants. For instance, take the *Dracæna terminalis*; the crimson colouring of the leaf is only the transfusion of the colouring matter of *D. ferrea*, brought out by the sporting variegation of a light ground. Had the sport or variegation been a yellow ground, the effect would have produced red instead of crimson. Take the Virginian creeper, again : as soon as the cold nights of autumn set in, the sap becomes checked, the leaf turns yellow in its ground colour, which immediately throws out the colouring of the outward tissue red ; the same with the scarlet oak, maple, and many other trees which give to English scenery the beauties of autumnal tint. The same law of creation is beautifully carried out as regards birds, butterflies, shells, and insects. Take the lobster and prawn, for instance : the brown colouring matter on the crust of the living fish, when the shell is changed by the scalding water, throws out a brilliant red. All islands possess fewer brilliancies of colour in vegetable and animal life than continents, from the cloudy exhalations in the atmosphere excluding the free electric action of the sun, which is the source of all light and colour. The same simple yet wonderful law of nature in colour will account for the vegetation of our earth partaking universally of green. It has been stated that the great Creator, with kind benevolence for the human race, selected this colour as being most refreshing to the eye, and we all acknowledge it is so ;

but as all His works are regulated by unerring laws, are we presumptive when we venture to assist vegetable reproduction here on earth? No; we are told, "Whatsoever thy hand findeth to do, do it with all thy might;" and as Horticulture is the servant of nature, we, as true servants, are bound to consult our master in all things. The sun, being the great electric battery in creation, throws its rays into space, and affects, and is affected in turn by, the planet earth which we inhabit. The atmosphere becomes denser and denser as the earth is approached, exciting more and more the electric ray-producing heat, with combustion to a certain extent, which naturally throws off a yellow tint, as all combustion does, which intensifies itself to red, according to the density of the atmosphere it is reflected through. This is very evident at the rising and the setting of the sun, the atmosphere taking a greater range in its direct line at these times. When the sun is at its meridian the atmosphere becomes thinner or more rarefied; its reflection then tints everything with yellow. Without the sun the natural tinting of nature throughout space is blue, and as all vegetation is constantly being organized by these two primitive colours, yellow and blue, they naturally make all vegetation green; and if it were possible for vegetation to proceed without the capillary attraction and heat of the sun, throwing off as it does its yellow tinting colour, vegetation naturally would be blue instead of green.—*A. J. Maule, Bristol, in the Farmer.*









